NOVEMBER 4, 1937

THE IRON AGE

LIBRARY
WEST VIRGINIA UNIVERSITY

REPUBLIC STEEL

20TH CENTURY

17TH CENTURY

IRON SEEMETH A SIMPLE METAL
BUT IN ITS NATURE ARE MANY
MYSTERIES" AND MEN WHO BEND
TO THEM THEIR MINDS, SHALL,
IN ARRIVING DAYS, GATHER
THEREFROM, GREAT PROFIT
NOT TO THEMSELVES ALONE
BUT TO ALL MANKIND.

JOSEPH GLANVILL, 1656

CORPORATION

. . . to all mankind, daily and in many ways, Republic brings profit through its achievements in new and improved alloy and carbon steels, perfected stainless and heat-resisting steels, mechanically perfect electric weld pipe, heat-treated alloy steel casing and other standard and special steels and steel products of unfailing uniform high quality. Soon for all industry, Republic will widen further the doorway to profit by placing in operation the largest, fastest and most modern hot and cold continuous strip mill in the world.

REPUBLIC
STEEL

GENERAL OFFICES
CLEVELAND, OHIO

AS-ENG LIB.
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I-C
V.140
No.19
N. 4, 1937

A Gentleman by Breeding~

BUT A 'MUG' AT HEART!

ELEPHANT BRAND
PHOSPHOR BRONZE

Amenable to discipline in machining, well behaved through all shop operations, ELEPHANT BRAND PHOSPHOR BRONZE can be worked easily and quickly . . . turned, bored, planed, tapered, hobbed, reamed, filed, drawn, ground, welded, cast, etc., with minimum effort, headache and cost.

Easy to handle~

FREE TURNING
FREE BORING
FREE PLANING
FREE TAPERING
FREE HOBBING
FREE REAMING
FREE FILING
FREE DRAWING
FREE GRINDING
FREE WELDING
FREE CASTING
ETC.

TOO TOUGH TO DESTROY

Panty-waist? NO! This metal has guts that few others can equal. Corrosion can't sap it; neither acid waters, corrosive fumes, moisture can impair its long, useful life. Nor can tortuous treatment rob it of strength and toughness and natural elasticity. ELEPHANT BRAND PHOSPHOR BRONZE is enduring for years on applications where formerly other metals required continual maintenance. It is recommended for just such spots . . . and it's available in the form you require and in the correct alloy—for prompt delivery.

STOCK AND PRICE LISTS, YOURS WITHOUT OBLIGATION

PHOSPHOR BRONZE SMELTING CO.

2210 WASHINGTON AVENUE · PHILADELPHIA, PA.

SILCROME STAINLESS STEEL *IMMEDIATELY AVAILABLE*

OVERNIGHT from all principal metal working centers, backing up eighteen strategically located Ludlum warehouses, are mill stocks and complete mill facilities at Watervliet and Dunkirk, New York. Dunkirk is close to the rail center of the country and permits direct water shipments to all Great Lakes ports. Watervliet is in the heart of the industrial East with facilities for rail or water shipments to both coasts.

Typical of mill stocks maintained for the convenience of Ludlum customers are the accompanying inventories of Silcrome Stainless 12-EZ and 18-8-EZ Cold Finished, available subject to prior sale.

To insure prompt shipment of special sizes, large amounts of hot rolled bars are also stocked at the mill ready for cold finishing.

Call Ludlum when your need is urgent. You will find an organization of experienced steel men ready to go the limit for you—whatever your problem may be. Ludlum Steel Co., 1104 A Street, Watervliet, N. Y.

MILL STOCK

SILCROME 12-EZ

ROUNDS	POUNDS	ROUNDS	POUNDS	HEXAGONS	POUNDS
1/4"	5,160	1-1/16"	1,473	1/4"	115
5/16"	5,943	1-1/8"	3,157	5/16"	421
3/8"	5,761	1-3/16"	852	3/8"	235
7/16"	4,096	1-1/4"	4,841	7/16"	158
1/2"	5,111	1-5/16"	469	1/2"	336
9/16"	6,073	1-3/8"	3,637	9/16"	1,157
5/8"	7,789	1-7/16"	819	5/8"	307
11/16"	1,462	1-1/2"	2,591	3/4"	771
3/4"	5,681	1-5/8"	726	13/16"	465
13/16"	815	1-3/4"	3,152	7/8"	444
7/8"	5,817	1-7/8"	665	1"	1,828
15/16"	927	2"	3,541	1-1/8"	536
1"	3,371			1-5/16"	331
				1-3/8"	559

SILCROME 18-8-EZ

ROUNDS	POUNDS	ROUNDS	POUNDS	HEXAGONS	POUNDS
1/4"	2,832	1-1/16"	1,217	1/4"	156
5/16"	3,211	1-1/8"	3,627	5/16"	178
3/8"	4,421	1-1/4"	6,114	3/8"	471
7/16"	3,661	1-5/16"	928	7/16"	476
1/2"	6,153	1-3/8"	5,319	1/2"	1,117
9/16"	3,756	1-7/16"	1,151	9/16"	573
5/8"	7,411	1-1/2"	4,172	5/8"	454
11/16"	1,251	1-5/8"	3,218	11/16"	1,553
3/4"	5,826	1-3/4"	2,335	3/4"	1,327
13/16"	1,518	1-7/8"	1,961	13/16"	631
7/8"	4,884	1-15/16"	1,451	7/8"	1,118
15/16"	2,267	2"	3,447	1"	552
1"	6,631			1-1/16"	756
				1-1/8"	486
				1-1/4"	916

LUDLUM

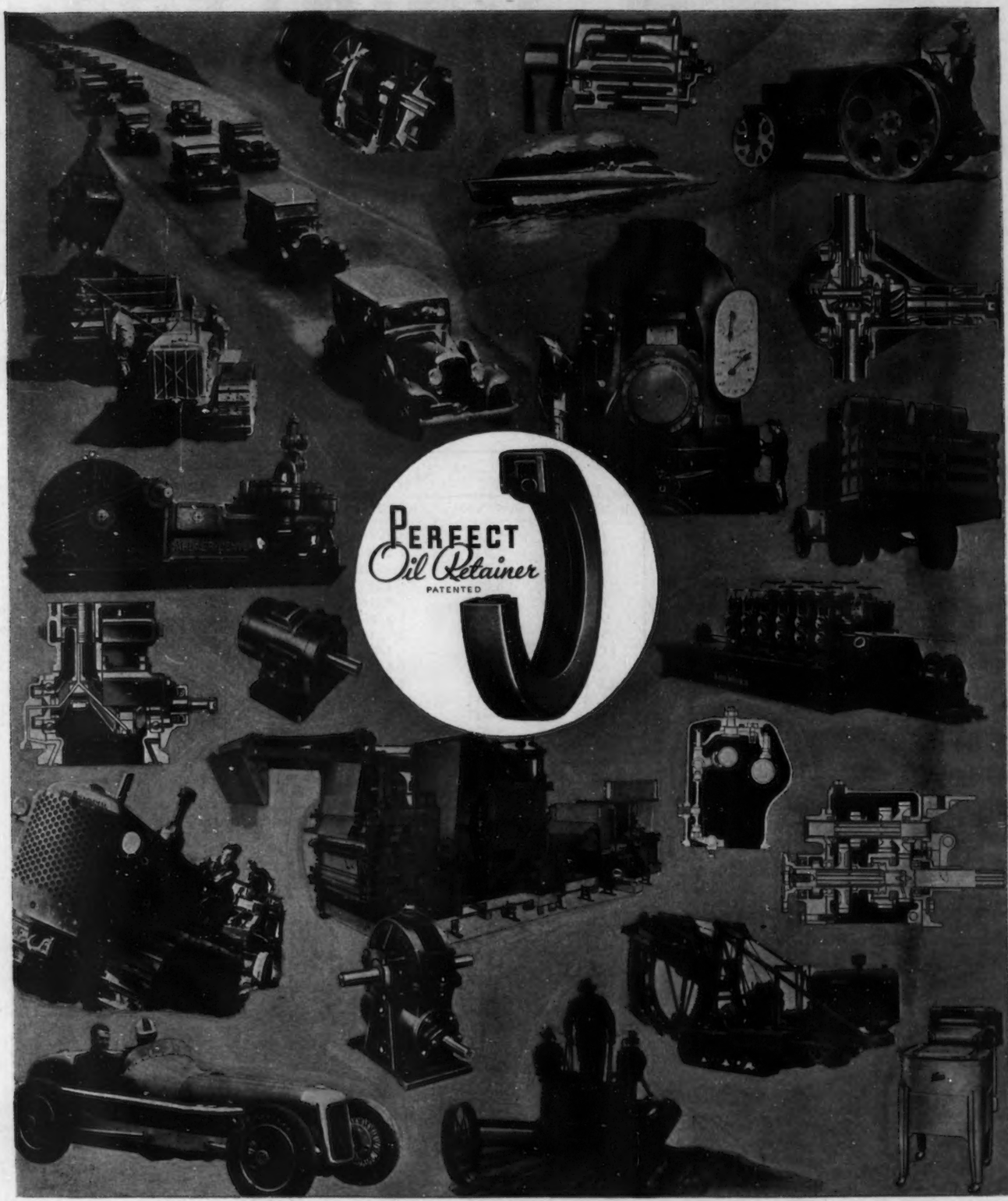
FINE STEELS SINCE 1854

TOOL · STAINLESS · CARBON · ALLOY

THE IRON AGE, published every Thursday by the *CHILTON CO. (INC.)*. Publication Office, Chestnut & 56th Sts., Philadelphia, Pa. Editorial and Executive Offices, 239 W. 39th St., New York, N. Y. Entered as second class matter November 8, 1932, at the Post Office at Philadelphia under Act of March 3, 1879. $6.00 a year in U. S., Canada $8.50, Foreign $12.00. Vol. 140, No. 19.

"PERFECT" OIL SEAL

Boon Companion of all Bearings



CHICAGO RAWHIDE MANUFACTURING CO.

59 Years Manufacturing Quality Mechanical Leather Goods Exclusively

1306 ELSTON AVENUE
CHICAGO, ILLINOIS

PHILADELPHIA CLEVELAND NEW YORK DETROIT BOSTON PITTSBURGH CINCINNATI

"Cut your losses and let your profits ride"

That was the entire philosophy of one of the most successful investors who ever lived. The same sound thinking can make money in manufacturing.

In almost every plant there is equipment that somebody just can't bring himself to junk—equipment that "seems as good as new" and is still producing. Trouble is, it may be *producing losses.*

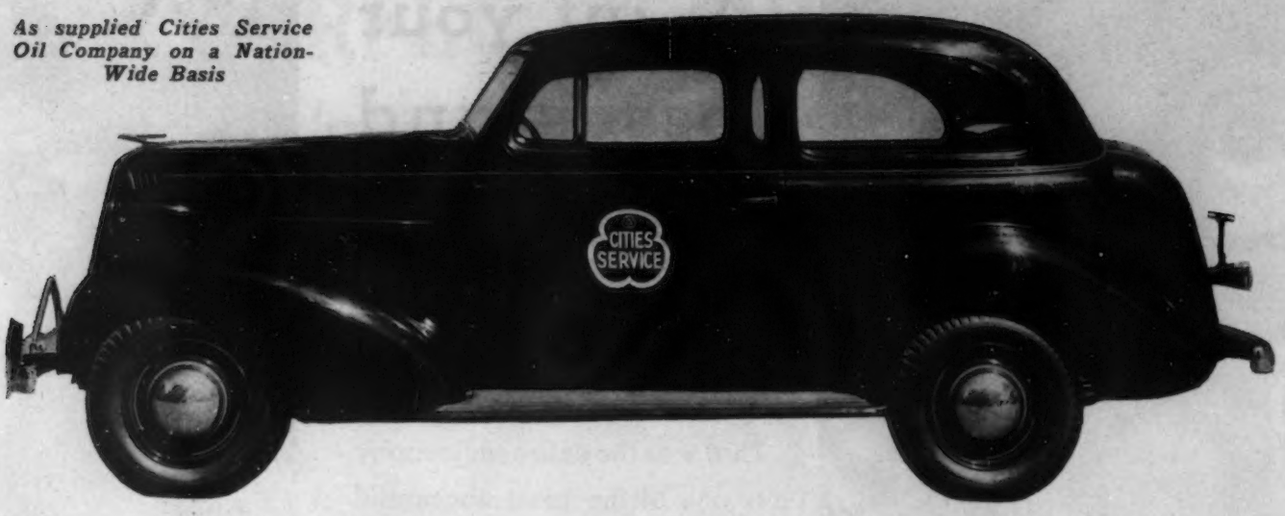
Unless your equipment such as turret lathes is as fast, as accurate, as easy to operate as the most modern on the market, you are not getting the profits which could be yours.

As one hard-headed manufacturer puts it, "I sell my old turret lathes for anything I can get. Let my competitors lose money running them. My new Warner & Swaseys will pay for themselves in a year, and put me in the strong position of having the lowest production cost in my industry."

WARNER & SWASEY
Turret Lathes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS—WITH A WARNER & SWASEY

As supplied Cities Service Oil Company on a Nation-Wide Basis



A NEW CAR for Every Salesman and Not One Cent Invested

Without investment, without the cost and annoyance of repairs, your representatives can drive brand new cars, maintained in perfect condition.

Your men will cover more ground, do more work, keep appointments more punctually, and make a better impression for your company, when provided with first class transportation. Moreover, you will know in advance the exact cost per month.

YOU GET

Cars replaced with new models every 12 months.

Fire, Theft and Collision insurance.

All repairs and parts—mechanical or those caused by accident.

All repairs and parts due to collision.

Replacement of tires and repairs thereto.

Oil, grease, towing and adjustments.

Winter service.

License plates. (For State where cars will be operated.)

Replacement of cars if destroyed by fire, collision or otherwise.

No restrictions placed on mileage or use of cars at any or all times.

Decalcomania permitted.

YOU PAY

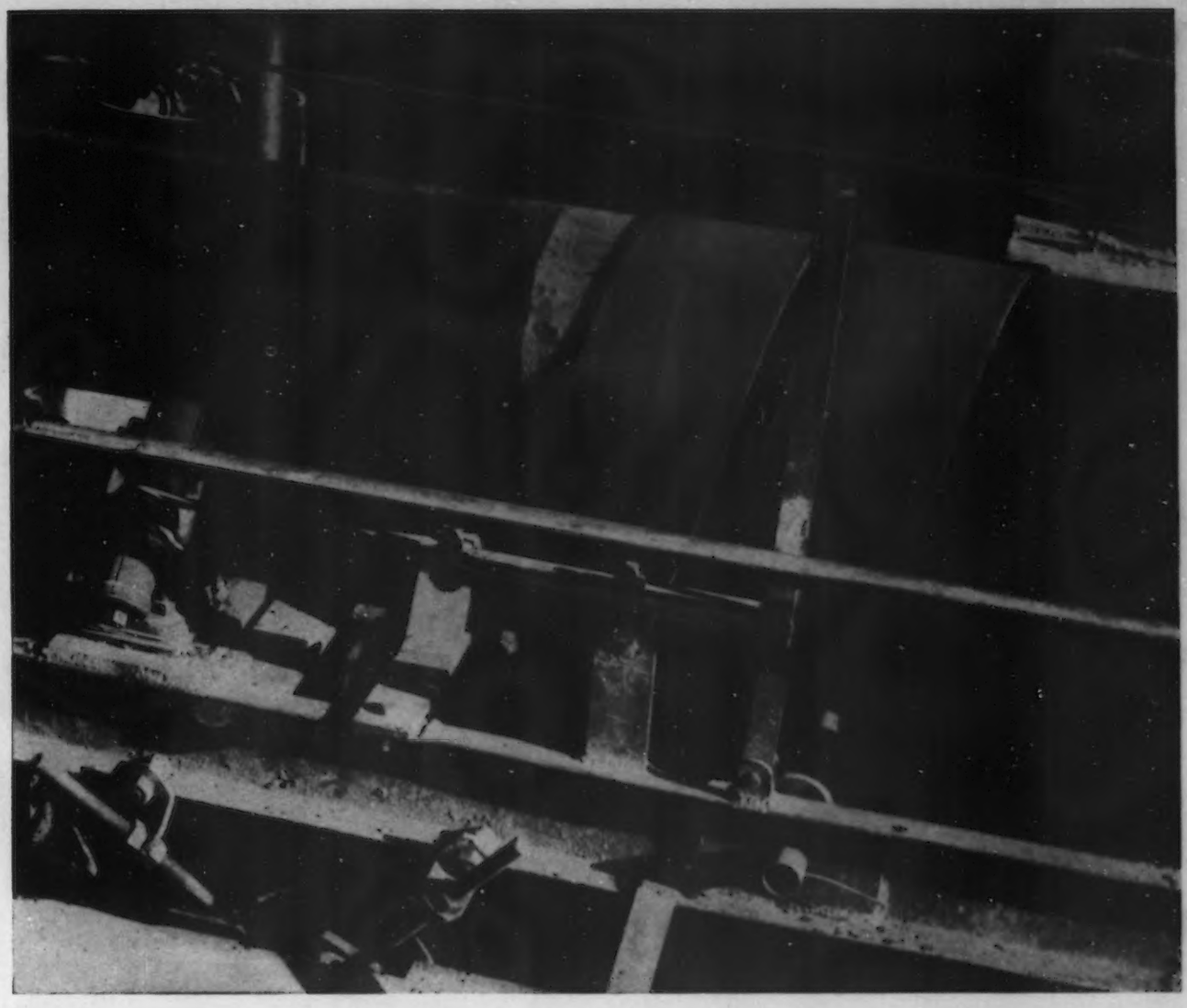
Only a small flat monthly rate—regardless of miles traveled. It includes everything but gas, and your p.l.-p.d. insurance.

The maximum cost of your salesmen's transportation, operating under our plan, would not exceed 3½¢ per mile, everything included.

Whether you operate one car or a fleet, this plan will save you money. Some of our National Fleet users are The Vanadium Corp., Colgate-Palmolive-Peet, Cities Service, N. Y. Herald Tribune, Philadelphia Daily News, Canada Dry Ginger Ale, Akron Beacon-Journal, Pittsburgh Post Gazette, Sayre & Fisher Brick Co., etc. It will pay you to get full details.

ROBINSON AUTO RENTAL COMPANY

49th and CHESTNUT STS., PHILADELPHIA, PA.



Pipe gets an asphalt bath if belt stands 5000 pounds pull

A typical example of Goodrich improvement in rubber

MOST belts turn pulleys. Loads are heavy, but motion is usually steady and in one direction. The belt above had to twist, stretch and turn, twice around the pipe, also around a complicated pulley system below it, revolving the pipe and pulling it forward at the same time.

The pipe goes through a machine that gives it a coating of asphalt—as long as the belt stands this twisting and turning plus a tension over 5000 pounds. A clever, well-designed installation except for one basic trouble: No belt could be found that would last more than two hours.

Then plant engineers noticed that failure always started at fasteners or splices, decided to try a Goodrich Highflex belt with the newly developed "Plylock" splice, a splice that cannot open at the seams because the seams are under the surface. The first Goodrich belt lasted 14 days—nearly 50 times the best record before.

Technical development makes startling improvements, and Goodrich has applied such development to *every* industrial rubber product. Modern Goodrich conveyor belts carry more tons than belts ever carried before; hose resists abrasive wear, sunlight, oils, chemical actions of the various materials handled; rolls and tank linings are made to last almost indefinitely; new rubber products appear month after month, most of them made to fit customer's special requirements and problems. Somewhere in your own plant the extra quality resulting from Goodrich research in rubber can make a saving *today*. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

YOUR LIGHTING DOLLAR BUYS MORE WITH...

22% more light is yours from these modern light sources. They start instantly and hang horizontally to give the best light distribution. You save, in addition, because you can run more lamps per circuit. The improved appearance has added to the immediate acceptance by industry of this improved lamp.

Even in the most difficult places you are assured an ease of seeing that profits both the worker and the manufacturer. These new "24-hour skylights" produce a soft, non-fatiguing light that reveals detail . . . promotes better work . . . and reduces errors.

There's a representative nearby who will be glad to give you complete information. He will gladly survey your needs and tell you what modern Cooper Hewitt lighting can do for you. If you prefer, write directly to the General Electric Vapor Lamp Company, 833 Adams Street, Hoboken, New Jersey.

There is no glare from polished metal surfaces . . . scratches are easily detected . . . eyes are rested . . . and better work is more easily accomplished with the "better than daylight" illumination of the new horizontal Cooper Hewitts.

GENERAL ELECTRIC VAPOR LAMP COMPANY

842C

TANKS

CRUDES · STACKS
TOUCHES · VATS
UP TAKES · FLUES
SUCYS · SCRUBBERS
HOODS · BOILERS
UNFIRED PRESSURE
VESSELS, etc.

. . . . . fabricate them from

WORTH

Sheared Steel Plate!

Tho Right Steel for every purpose, in plates up to 130" wide. Tank or Sheet Steel—Copper Bearing Steel—Firebox Steel—Flange or Boiler Steel—Ordinary Fire Box—Stiff Bottom—Low Phosphorus Fire Box—Marine—Material subject to Navy Department specification and inspection—Navy Department Boiler Steel (Classes A, B and C)—Hull Plates to Lloyds and American Bureau Specifications. We also manufacture steel plates to all A.S.M.E. and A.S.T.M. Specifications for use in high pressure vessels.

REPRESENTATIVES

WORTH STEEL COMPANY · CLAYMONT · DEL.

Are you accepting

U·S·S
HIGH TENSILE
STEELS

UNITED STATES STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York* · CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago* · COLUMBIA STEEL COMPANY, *San Francisco* · NATIONAL TUBE COMPANY, *Pittsburgh* · TENNESSEE COAL, IRON & RAILROAD COMPANY, *Birmingham*

United States Steel Products Company, New York, *Export Distributors*

the challenge of COR-TEN ?

FOR years engineers and designers have said "Give us a steel that is stronger—that will stand up in service—give it to us at a price we can afford to pay—and we will build our equipment lighter."

So we produced COR-TEN

- *— almost twice as strong as ordinary steel*
- *— with 4 to 6 times the resistance to atmospheric corrosion*
- *— with greater impact strength*
- *— with superior fatigue resistance*
- *— high in abrasion resistance*
- *— a steel you can fabricate with little change in shop practice*
- *— a steel that has made it possible to build mobile equipment 20—50% lighter — just as strong, just as rugged as the heavy construction it replaces.*

And now, the one obstacle to COR-TEN's general use has been removed. Today its cost per pound is so close to that of ordinary steel that in many applications COR-TEN actually costs less per unit of strength than plain steel.

Thus COR-TEN meets all the requirements set for the ideal material for lightweight construction—it has great strength, superior endurance and stamina, unusually high corrosion resistance. Its cost is reasonable. So why not build lighter with COR-TEN? Why not get rid of excess weight that costs you money every time you move it?

Find out how little it costs to apply COR-TEN in your equipment. Our records of its use in thousands of lightweight freight cars, in high-speed passenger equipment, in the new streamlined trolleys, in trucks and buses, tractors and trailers, in steam shovels, cement mixers and mine skips, in mobile equipment of all kinds, are available to guide you in its economical application.

USS

Easier on

Texaco Crater quiets even old, worn gears and pinions. Reduces the noise by stopping the undue wear. Crater doesn't channel, squeeze out, throw off.

TEXACO

NERVES as well as gears

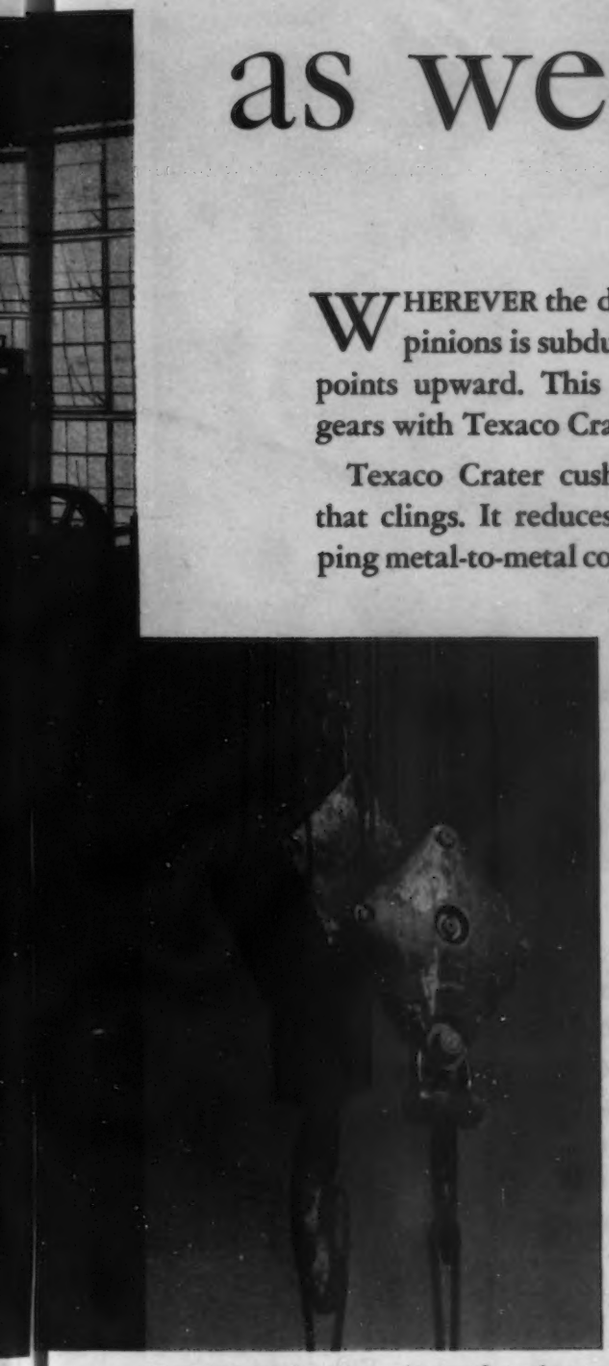
WHEREVER the deafening clang and ring of open gears and pinions is subdued, working conditions improve and output points upward. This is one of the big reasons for lubricating gears with Texaco Crater.

Texaco Crater cushions gears in a tough, wear-defying film that clings. It reduces the noise. Stops the undue wear, by stopping metal-to-metal contact. Used on wire rope, Texaco Crater coats each individual wire in a viscous, weatherproof, corrosion-resistant lubricant that penetrates to the very center strands.

If you are now using on gears and wire rope lubricants that channel, drip, ball up and throw off, go over to Texaco Crater.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Industrial Lubricants. Prompt deliveries assured through 2070 warehouse plants throughout the United States.

The Texas Company, 135 East 42nd Street, New York City.



Texaco Crater doesn't merely coat the surface, to throw off at high speeds around small sheaves . . . it penetrates to the very core of the rope, lubricating and preserving it.

FREE TO YOU . . . *this 32-page booklet of money-saving information on the use and application of Crater. Shows how to build simple rigs for applying Crater to wire rope. Write for your free copy.*

CRATER

You can tell by the *feel* that it's good pipe

THERE'S a good feel to Bethlehem Steel Pipe when it's cut or threaded—a feel that means, to experienced hands, good, sound pipe. Bethlehem Pipe readily takes the clean, accurate threads that are a sign of soft steel, free from inclusions and hard spots. Bethlehem Pipe is free from scale, inside and out. And above all, Bethlehem Pipe is soundly welded—it is free from pin-hole leaks; free from any danger of splitting or rupturing.

Available through your distributor, in all standard sizes and weights. Either in open-hearth steel or in Beth-Cu-Loy rust-resisting copper-bearing steel.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Increase your profits with J&L STEEL

Instant steel service is YOURS

. . . . call your J&L Warehouse

Steel users large and small find Jones & Laughlin Warehouse Service fast . . . economical . . . complete . . . dependable. You, too, will get steel quickly . . . in ready-for-use form . . . from *your* J&L Warehouse.

J&L Warehouses are conveniently located. They carry high quality steel products to meet your individual requirements for safety . . . appearance . . . economy. Jones & Laughlin Warehouses are fully equipped for bending, forming, welding, cutting and fabricating steel to meet your *exact needs.*

Your J&L Warehouse saves you money and prevents delays. When time means money . . . for high quality steel products . . . order from your Jones & Laughlin Warehouse. Write today, on your business letterhead, for your J&L Warehouse Stock List.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

MAKERS OF HIGH QUALITY IRON AND STEEL PRODUCTS SINCE 1850

J&L WAREHOUSES

PITTSBURGH · CINCINNATI · DETROIT · NEW ORLEANS · CHICAGO

NEW YORK

FOR EVERY NEED . . . THE RIGHT QUALITY OF STEEL IN A FULL RANGE OF SIZES

For Firing S
STRAIGHT BLAST
is now being used

• Heating cold ingots is accomplished just as fast with *straight blast furnace gas* in the one-way fired pit as with straight coke oven gas in conventional reversing pits. Let SC engineers tell you how you can utilize *straight blast furnace gas* with all the advantages of automatic control of temperature, pressure and atmosphere.

SURFACE COMBUSTION CORPORATION • TOLEDO, OHIO

SURFACE COMBUSTION

Builders of ONE WAY FIRED SOAKING PITS, BILLET HEATERS, PACK OR PAIR, ANNEALING, CONTROLLED ATMOSPHERE FURNACES, NORMALIZERS

MIDVALE TOOL STEEL

HAS BEEN TESTED IN EVERY TYPE OF MACHINING IN MIDVALE'S OWN SHOPS

Hogging large forgings and micrometer finishing of small parts—such are daily examples of Midvale production. The same problems of prompt delivery, of continuous shop production that face you, face us. And you have found, as have Midvale, that no single factor affects both these items more than the quality of tool steel used.

Whatever is your machining problem, it is a practical certainty that Midvale has had to solve it, here, in our own shops. Just as you can solve it in yours—with Midvale tool steel.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA

OFFICES: *New York • Chicago • Pittsburgh • Washington Cleveland • San Francisco*

This metal fabricating plant (name on request) uses 29 Westinghouse Ignitron Timers to cut costs and improve quality of resistance welds.

Westinghouse Ignitron Split-second Controls REDUCE WELDING COSTS

With the precise regulation of timing and current provided by Westinghouse Ignitron Controls, you can definitely cut costs on all types of resistance welding. Increased output, higher quality welds, and lower maintenance costs, can be attained by simply adding Ignitron Controls to your present equipment—and by specifying "Ignitron Control" on new welders being purchased.

And to cut costs still further, consider Ignitron Timers for resistance welding on many products, metals and alloys for which more expensive fabricating methods are now being used. If you have a problem of cutting costs, speeding up production, or improving quality in resistance welding operations, investigate Westinghouse Ignitron Welding Controls. Write for complete information today.

J 20452

DO YOU USE RESISTANCE WELDING *for*

ALLOYS ● ALUMINUM ● BRASS COPPER ● NICKEL ● STEEL STAINLESS STEEL ● TUNGSTEN or combinations of these metals? If so, it will, pay you to investigate Ignitron Welding Controls. Write today for booklet B. 2123. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

W WESTINGHOUSE ELECTRIC

Westinghouse *Ignitron Control* for RESISTANCE WELDING

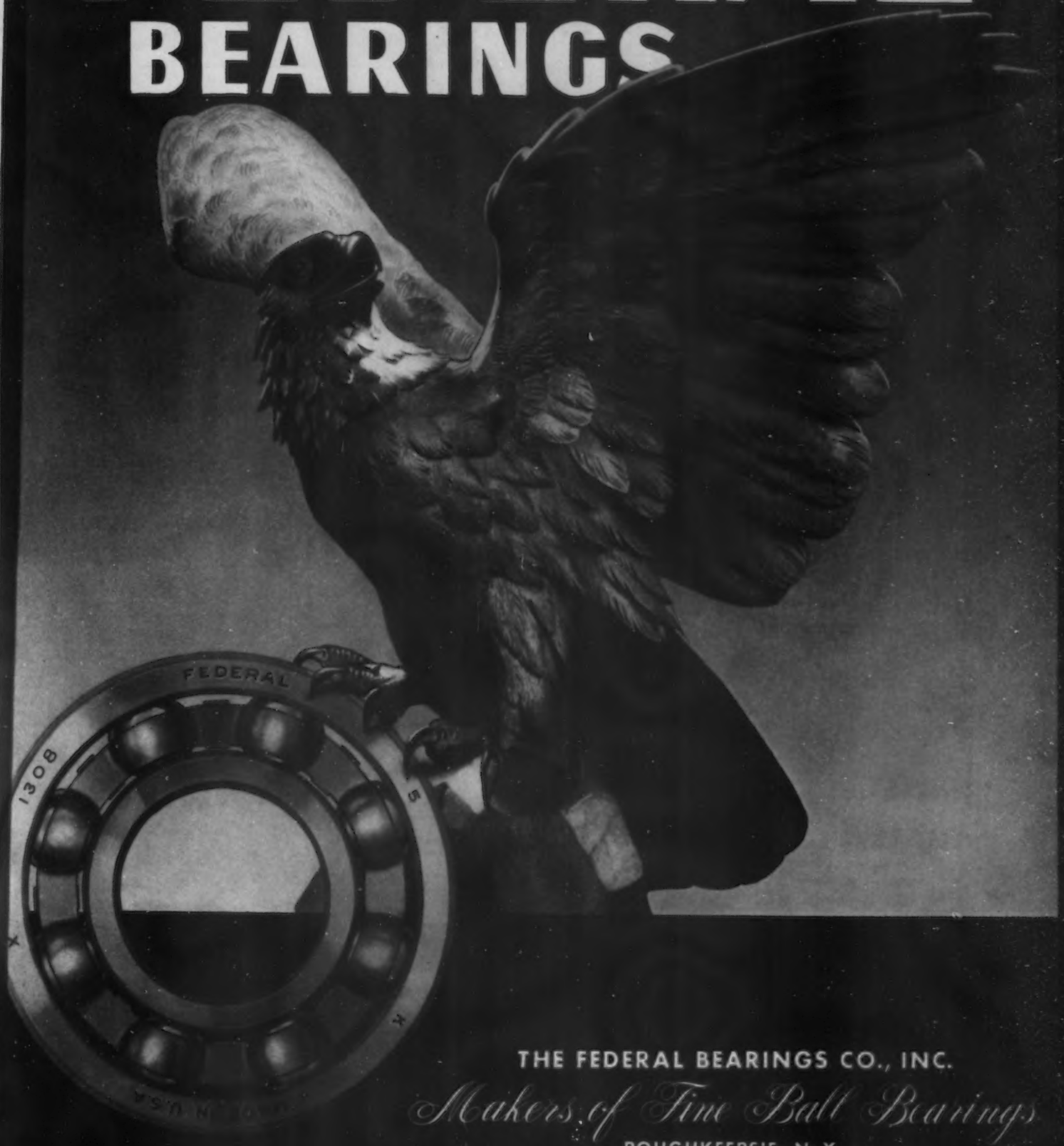
Whitey Sez:

"It takes years and years to grow an oak, but for a squash—six months is sufficient ... We're not raising acorns, but the fruits of our ten years' labor could hardly be squeezed thru a colander, either!"

MAURATH, INC., CLEVELAND

BUILDER OF BETTER WELDING ELECTRODES IN ALL ANALYSES

FEDERAL
BEARINGS



THE FEDERAL BEARINGS CO., INC.

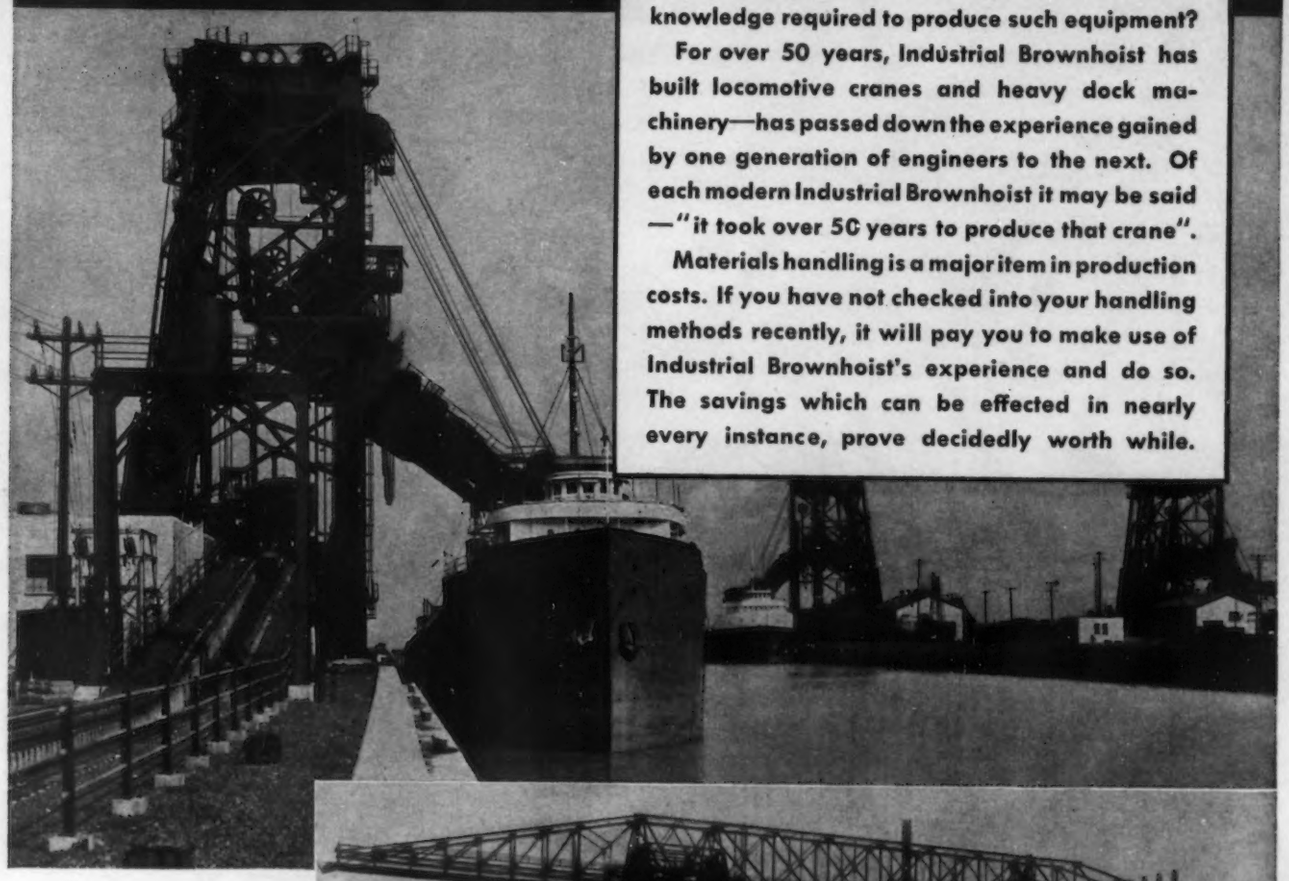
Makers of Fine Ball Bearings

POUGHKEEPSIE, N. Y.

Detroit Sales Office: 2608 Book Tower • Chicago Sales Office: 120 N. Peoria St.

Cleveland Sales Office: 402 Swetland Building

Loading 120 tons of coal per minute Handling 15 tons of ore per grab



While watching modern dock machinery handle huge tonnages of coal, ore or stone, have you ever stopped to consider the vast amount of technical knowledge required to produce such equipment?

For over 50 years, Industrial Brownhoist has built locomotive cranes and heavy dock machinery—has passed down the experience gained by one generation of engineers to the next. Of each modern Industrial Brownhoist it may be said —"it took over 50 years to produce that crane".

Materials handling is a major item in production costs. If you have not checked into your handling methods recently, it will pay you to make use of Industrial Brownhoist's experience and do so. The savings which can be effected in nearly every instance, prove decidedly worth while.

Each of the three Industrial Brownhoist car dumpers shown above will dump 120 tons of coal per minute. The bridge crane, at the right, has a bucket capacity of 15 tons of ore.

LOCOMOTIVE CRANES, 10 TO 200 TONS CAPACITY
CRAWLER CRANES, 6 TO 25 TONS CAPACITY
ERECTION CRANES, 10 TO 75 TONS CAPACITY
ORE AND COAL HANDLING BRIDGES
CAR DUMPERS FOR COAL AND ORE
CLAMSHELL BUCKETS

INDUSTRIAL BROWNHOIST CORPORATION
General Offices: Bay City, Michigan
District Offices: NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO

INDUSTRIAL BROWNHOIST

Parts Cost Cut in Half by Switch to Inland Steel

Have You Recently Checked Materials Used In Your Plant?

It's preserving a constant lookout for small wastes that keeps manufacturing costs low. Those wastes creep unseen into cost records . . . then grow and multiply into substantial losses over a year's time.

For example, a manufacturer of vehicle bodies was using an expensive non-ferrous metal for a difficult, small circular stamping.

Inland Deep Drawing Tin Plate proved just as satisfactory for the purpose and made a big saving in material cost.

Inland field men and metallurgists are constantly devoting their time to making savings in the fabrication and uses of steel. You can utilize their efforts in the cost-checking procedure of your plant without cost or obligation. Just call your nearest Inland office.

And Inland Mills are able to follow through! The close cooperation between Inland field men and mill men quickly and definitely adjusts today's most modern steelmaking facilities to each customer's individual requirements. Photo shows Roughing Stand in 76" Inland Hot Strip Mill.

INLAND STEEL

EETS • STRIP • TIN PLATE • BARS • RAILS • TRACK ACCESSORIES • PLATES • FLOOR PLATES • STRUCTURALS • PILING • REINFORCING BARS

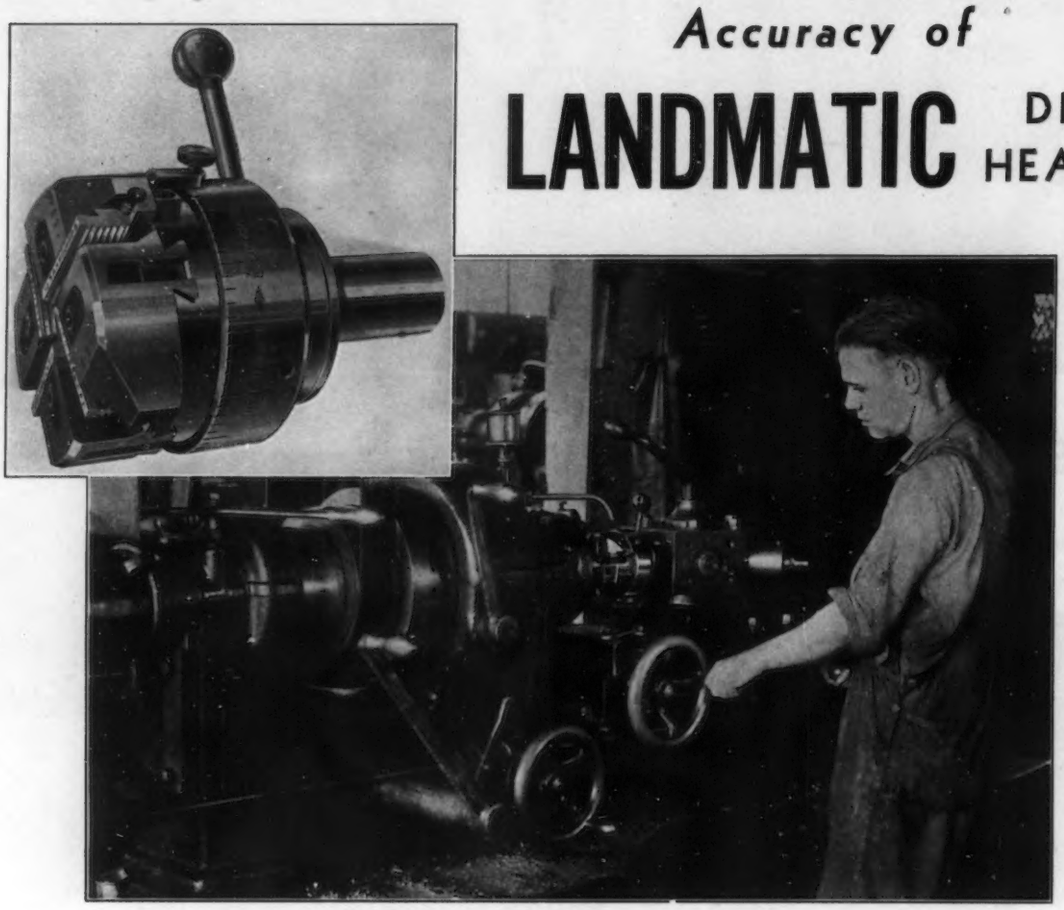
INLAND STEEL CO.

General Offices: 38 South Dearborn Street, Chicago, Illinois • Offices in: Detroit · Kansas City · Milwaukee · St. Louis · St. Paul

The performance of your Turret Lathes reflects the

Accuracy of

LANDMATIC DIE HEADS



The application of LANDMATIC Die Heads to your Turret Lathes effects an immediate improvement in their performance. Both the *Accuracy* and the *Quality of finish* of your threads will reflect the precision construction of LANDMATIC Die Heads.

The simplicity of their design, and the materials used in the construction of LANDMATIC Die Heads assure more accurate results.

The *Accuracy* of LANDMATIC Heads and the *Economy* of the LANDIS Patented Tangential Chaser guarantee modern production possibilities for your Turret Lathe threading operations—at a reduced operating cost.

May we send you more information? Write us today.

LANDIS MACHINE COMPANY, Inc.

Waynesboro, Penna.

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THE IRON AGE

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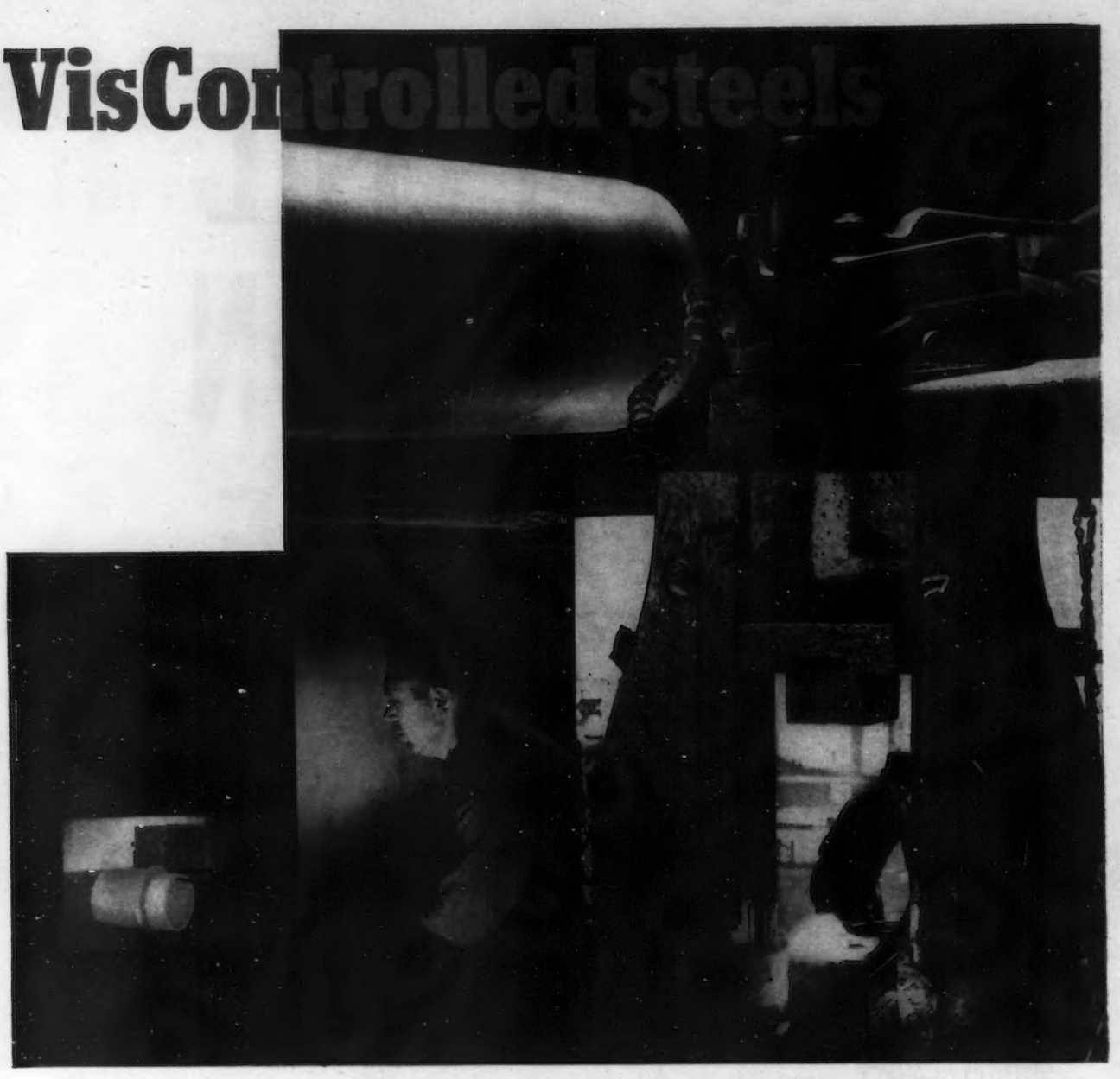
VisControlled steels



can be fitted to your particular processing

WHAT steps do you take in processing steel? Forging? Machining? Heat treating? Or a combination of all three?

It is important that the steel maker know this—for the ideal forging steel is not necessarily the ideal machining steel; steel which may be excellent for machining may not meet heat-treating requirements.

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BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

▲ ▲ ▲ THE IRON AGE ▲ ▲ ▲

November 4, 1937

ESTABLISHED 1855

Vol. 140, No. 19

Proving That Black Is White

THERE is an old saying which has been handed down from generation to generation and which is supposed to characterize one who has attained the highest degree of skill in the art of sophistry. Of such a one it is said: "He can prove that black is white."

Sophistry, as you know, is the art of presenting your argument in such a complex and involved way that your listeners forget the logic of the chain of reasoning and accept an erroneous conclusion as a fact.

One of the classic examples of sophistry is the proof that a cat has ten tails. Perhaps you remember how the argument runs: "No cat has nine tails, one cat has one more tail than no cat; therefore, one cat has ten tails."

Millions of susceptibles, probably, have swallowed this bit of sophistic reasoning whole and firmly believe that there are cats with ten tails each, regardless of the fact that they have never seen one and never will.

Protagoras, the father of sophists, five centuries B.C., through an elaborate but fallacious chain of reasoning, proved to the satisfaction of his followers that there is no such thing as objective truth; in other words that black may be white.

It probably took the eminent Protagoras many, many years to construct the plausible but erroneous chain of reasoning which enabled him to prove that black is white. And in the doing of it, he probably required many thousands of words of argument and exposition.

How far we have advanced in efficiency since the days of Protagoras! The modern sophist can give his predecessors cards and spades and still beat him at the game.

Today we have seen that it is possible to convince America that Black is white without saying a single word!

J. H. VanDeventer

Resistance Weld

By E. H. VEDDER and
J. W. DAWSON
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

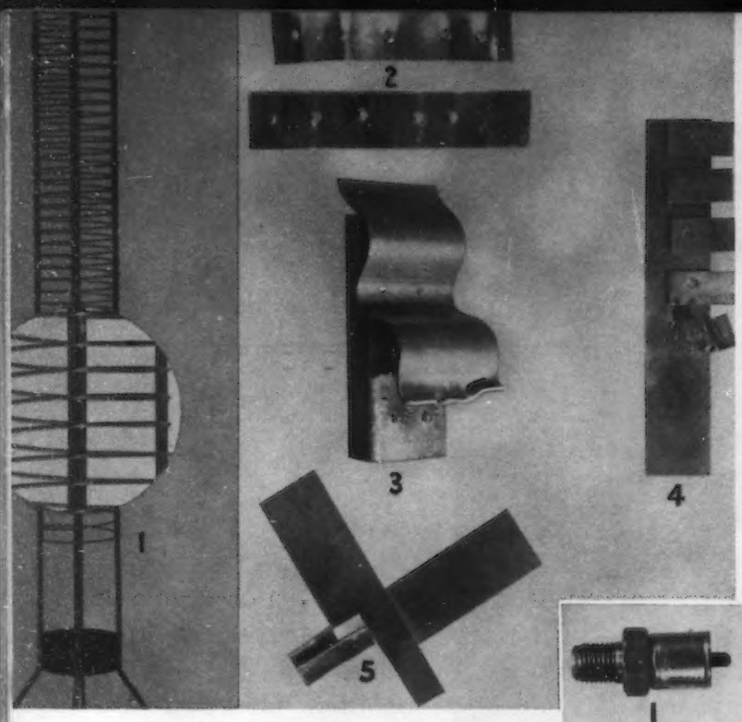

FIG. 1—Types of welds being made with Ignitron timers.

ABOVE

FIG. 1A—Spot Weld Samples: (1) Tantalum grid structure of large radio transmitting tube showing weld consistency; 3 cycles timing. (2) 0.036 in. thick aluminum sheet; 6 cycles timing; welding current 20,000 amp. (3) Section of the sidewalk structure of the Smithfield St. bridge, Pittsburgh. 0.81 in. thick; timing 6 cycles; welding current 28,000 amp. (4) 0.064-in. thick brass pieces to 0.064-in. thick mild steel strip; timing 3 cycles. (5) 0.064 in. thick steel strips, four welds invisible one side. Edge turned to show opposite side of one weld.

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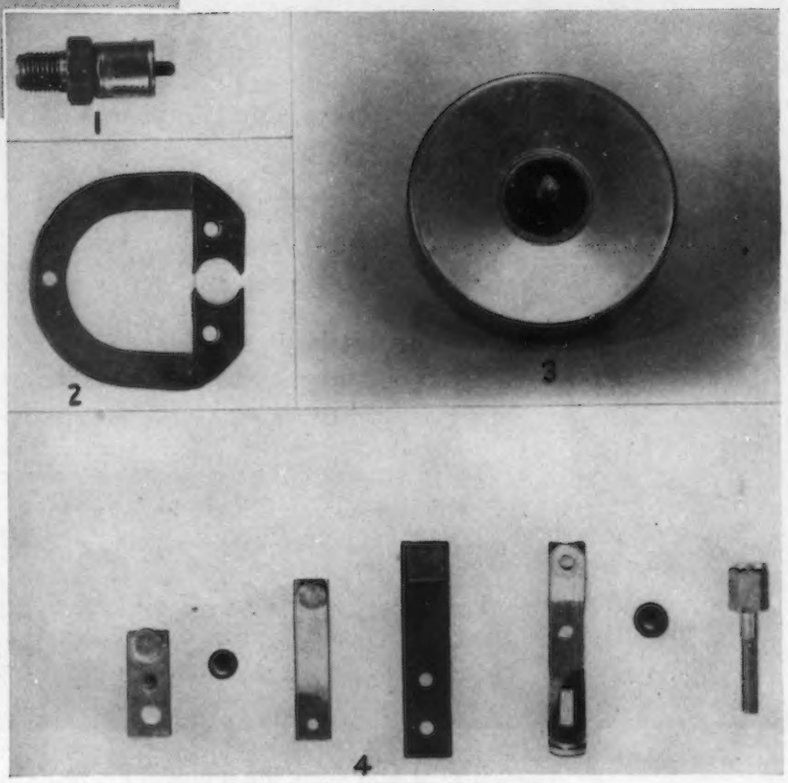
AT RIGHT

FIG. 1B—Projection Weld Samples: (1) Pressure tight fitting. Pressed cup welded to screw machine part with ½-in. diameter projection weld. (2) Permanent magnet. Hardened magnet steel horseshoe welded to two mild steel pole faces. Each weld is ⅝ in. long, and pole face gap is held to close tolerance. (3) Metal ignition tube parts. Anode lead-in Kovar eyelet welded to mild steel header with 1 in. diameter projection weld; vacuum tight. (4) Silver contacts with steel backs welded to cadmium plated brass, spring steel, and mild steel.



FOR years, it may be said, resistance welding* has been electricity applied to the blacksmith's art. Steel only was welded and heat so generously supplied as to practically allow forging as well. In fact, operators commonly guided their technique by redness of the parts. Automatic weld timing, when employed, was measured in seconds. The process, therefore, was largely confined to the coarser sheet steel structures which tolerate such undesirable welding aftermaths as severe as electrode marking, warping, blackening and scaling.

Within the last several years, however, resistance welding has become a precision process. Exact fractional-second timing as low as 1/120 sec. is largely responsible. Today, steel is welded without warping, burning or electrode marking on the exposed surface. Plated stocks are welded with little surface disturbance. Premachined mechanical parts are welded for accurate fit. Fully as important, resistance welding has been extended to a wide variety of the modern alloy metals such as to stainless steels, brasses and bronzes, and to non-ferrous metals of sharp fusion point, such as aluminum. Some examples of the new welding are shown in Fig. 1.

Coincident with improvement in quality has been improvement in welding speeds. In short, the resistance welding machine has been fitted with index or magazine feed and placed in the modern production line. As high as 120 ft. per min. of continuous formed channel is being fabricated from steel strip

* The term "resistance welding" as employed in this paper applies only to resistive type welding at maintained high contact pressure between welded parts. Flash welding is not included.

ing Widened by Tube Control-I

with 3-in. spaced spot, each the equivalent of a rivet.

Before describing the nature of these improvements and the manner in which they apply to specific fabrication problems, review will be made of the various factors in resistance welding and the means which have been applied for their control.

SPOT, butt, projection and seam welding and the factors influencing quality and cost are reviewed in this article. A section on weld timing includes data on ignition equipment, both for spot and seam welding. In a second part, to be published in an early issue, the authors outline the advantages resulting from the accurate control afforded by electron tube timers, and describe a number of interesting applications of ignition tube equipments.

The Resistance Welding Process

Resistance welding may be described as the one type of electric welding not accompanied by flashes, arcs or sparks. It is accomplished by clamping together metal parts and then fusing together their adjoining surfaces by resistive electrical heating. Suitable electrodes apply to the parts both pressure and current. In welding sheet or semi-flat structures, electrodes of small contact area are generally employed to concentrate both pressure and current at the point of weld. Examples are: spot welding using stud-type electrodes and seam welding using wheel-type electrodes. On the other hand, when parts are so formed as to inherently contact each other in limited area, electrodes of flat faced or clamping die form may be used. Examples are butt and projection welding.

In flowing from copper electrode to copper electrode through the work pieces, welding current encounters resistance principally at its contact point. Heat is generated, therefore, exactly where needed to fuse the work together. The amount of this welding heat is proportional to the welding current, the time of its flow and the resistance of the junction point which, in turn, is dependent upon the pressure. Further, the degree of spread of this heat through the parts during welding is also proportional to the welding time. Therefore, the three major variables involved in proper control of the process are: (1) Current mag-

AT RIGHT

FIG. 1C—Butt Weld Samples: (1) Instrument pivots 0.018 in. diameter, hardened steel welded on end to 0.007-in. thick steel ribbon. Cut apart for individual pivots and cemented to coil as shown. (2) Steel tubing 1 in. O.D. pre-machined. (3) Formed tubing 0.50 in. diameter with end notched to weld to hexagon screw machined part; drilled after welding. (4) Radio tube shell, mild steel welded to mild steel pressed bottom. Shell before welding shown. Timing 6 cycles; welding current, 35,000 amp.

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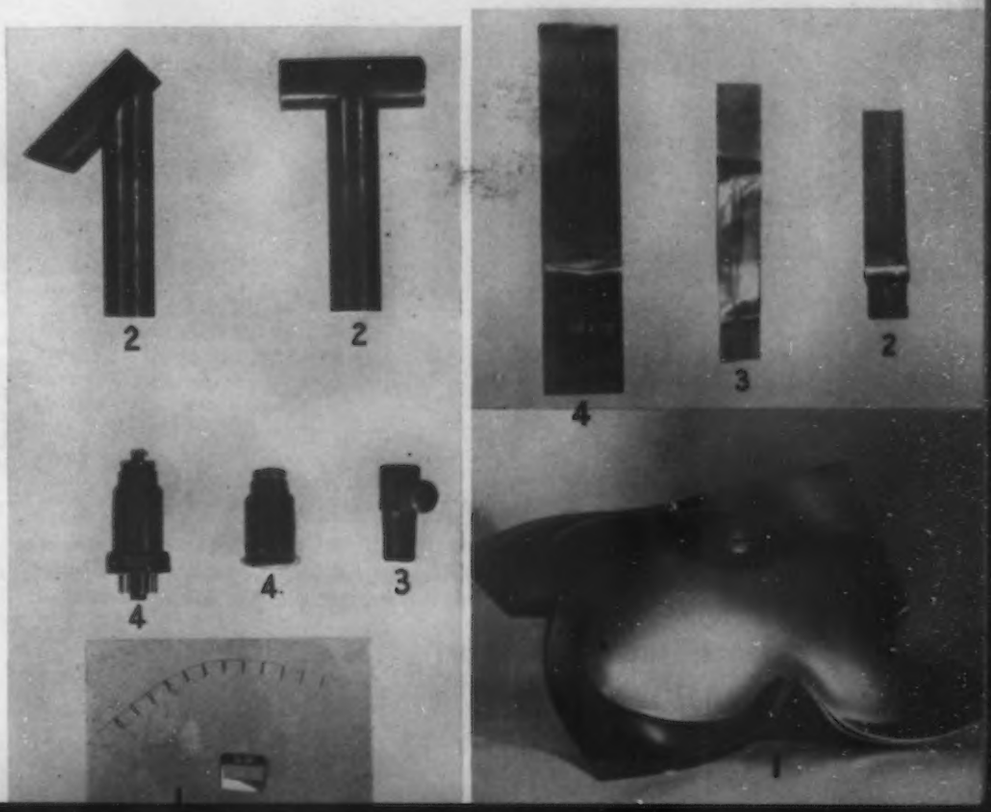
FIG. 1D—Seam Weld Samples: (1) Olympic bronze 0.05-in. thick test pillow. Pressure tight seam weld, 6 cycles "on," 4 cycles "off"; speed 4 ft. per min. Material failed near edge of weld at 480 lb. per sq. in. hydraulic pressure. Nipple gas welded. (2) Olympic bronze 0.05-in. thick seam welded; note stitch effect. (3) aluminum 0.04-in. thick, pressure tight seam weld with one sheet torn away; 3 cycles "on", 9 cycles "off"; speed 2 ft. per min. (4) Spaced spot type seam. Similar applications in service up to 120 ft. per min.



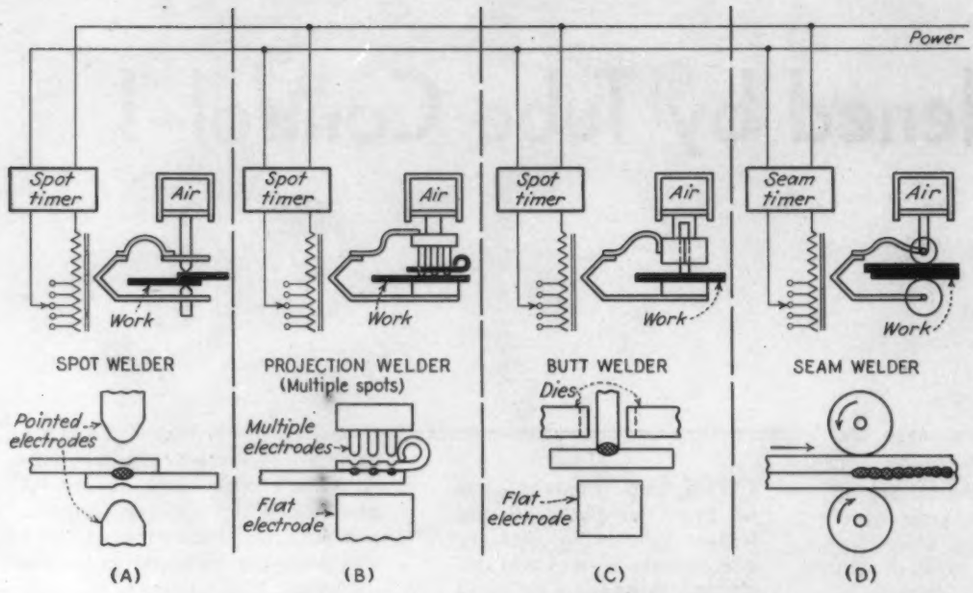


FIG. 2—Schematic views of various types of resistance welding machines and timers, together with cross-sections of typical welds.

nitude; (2) time of current flow, and (3) pressure.

Proper coordination of these variables and precise control of each is necessary to produce welds of: (1) Maximum strength, with, (2) minimum indentation, discoloration, metallurgical change or warping, and with (3) a high degree of consistency between welds.

Too long weld timing, as much as several seconds has, in the past, been the chief departure from best welding practices. It is now recognized that the majority of welds *should* be made in less than 1 sec. and as low as 1/120 sec. duration. Short weld timing is inherently more difficult to control with accuracy than is either current magnitude or pressure because of the mechanical and current interrupting problems involved.

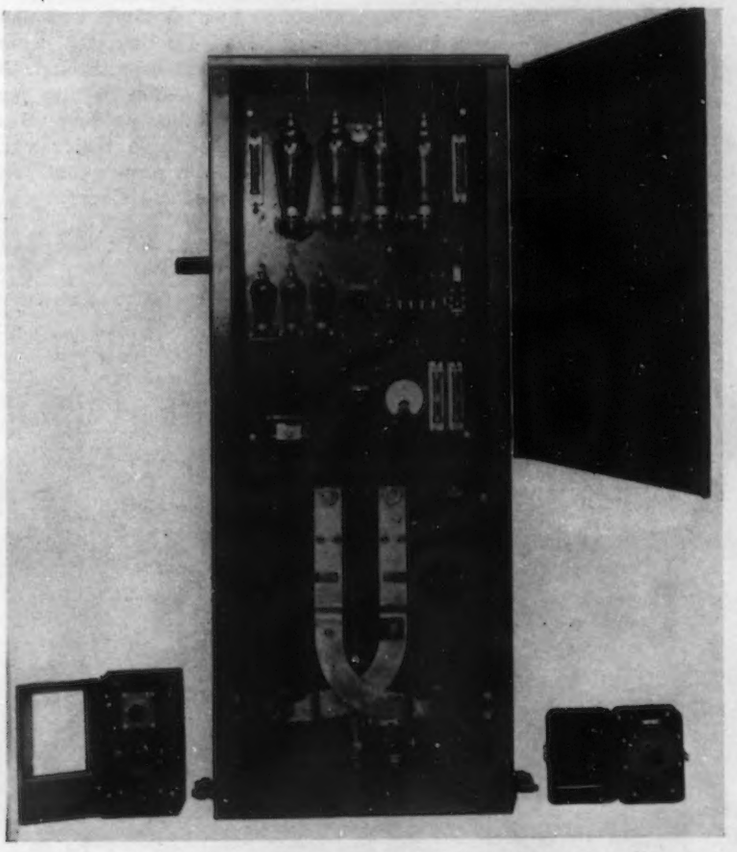


FIG. 3—Ignitron spot welding timer of intermediate rating using sealed-off tubes.

Within recent years, however, there have been on the market electronic timing control equipments which interrupt small or enormous current with all but absolute accuracy even with weld timing as low as 1/120 sec. The achievement of such accuracy by these electronic controls has not only accelerated the improvement of non-letronic timing controls but has also brought to light lesser inaccuracies in the control of all factors in resistance welding. Once known, such inaccuracies have been readily improved. In short, electronic timing has caused wide extension in the field of usefulness of resistance welding.

The equipment required in applying resistance welding is now generally assembled in what is known as the welding machine, to which power is delivered through some form of separate timing and interrupting device. In some cases, particularly when mechanical timers and contactors are used, these are also built into the welding machine.

The Resistance Welding Machine

The welding machine applies pressure and current to the parts being welded and is made in any

of the several forms known as spot, projection, butt or seam welders. The fundamental difference between these types of machines is the form of the welding electrodes which consist of studs for spot and projection welding, dies for projection and butt welding and wheels for seam welding. These electrodes are generally made from hard copper alloys, and are usually water cooled to increase their life. The machine consists of a rugged framework which houses a transformer and supports electrode arms, electrodes, and an electrode operating mechanism as shown schematically in Fig. 2. Since resistance in the metal parts being welded is low, extremely high current is required to generate welding heat. The transformer, therefore, steps down the voltage to a suitable value, usually 5 to 15 volts, with a corresponding secondary current of many thousands of amperes and is equipped with primary winding taps for current adjustment or if a large range of current adjustment is required, an auto-transformer is added having both coarse and fine steps of adjustment.

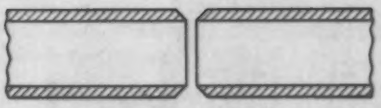


FIG. 4—Butt weld of two pieces of pipe shown in cross section. The pipe may or may not be beveled as shown.

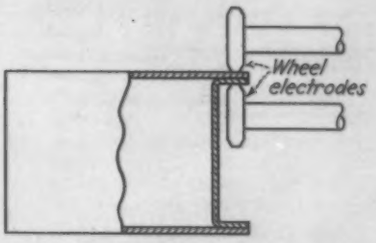


FIG. 5—Seam or roller welding of bottom into a cylindrical container.

The transformer secondary voltage is usually dictated by the total impedance to the flow of welding current which consists partially of resistance in material, electrodes, electrode arms and transformer. More important, however, is the inductive reactance of the innocent appearing circuit loop from transformer through electrode arms, electrodes and work. The reactance of this look is so high as to assume predominant control of welding current—the resistance playing little part. Thus, if the electrode arms are doubled in length, the secondary voltage required to force a given current through the work circuit will be approximately doubled. It is now evident that the kva. required to weld a given material depends more upon the dimensions of the welding machine throat necessary to receive the work than upon the thickness of two or even several sections of material.

The power factor of a welding machine is almost invariably poor because of the large proportion of inductive reactance in the secondary circuit. It is seldom that machine power factors of better than 60 per cent are obtained. Power factors of 30 to 50 per cent are more common for standard sheet metal welding machines. In some cases, however, power factors as high as 85 per cent are obtained but usually on machines with die

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FIG. 6—Ignitron seam welding timer installation. The insert shows the timing disk with pin clamping disk removed.

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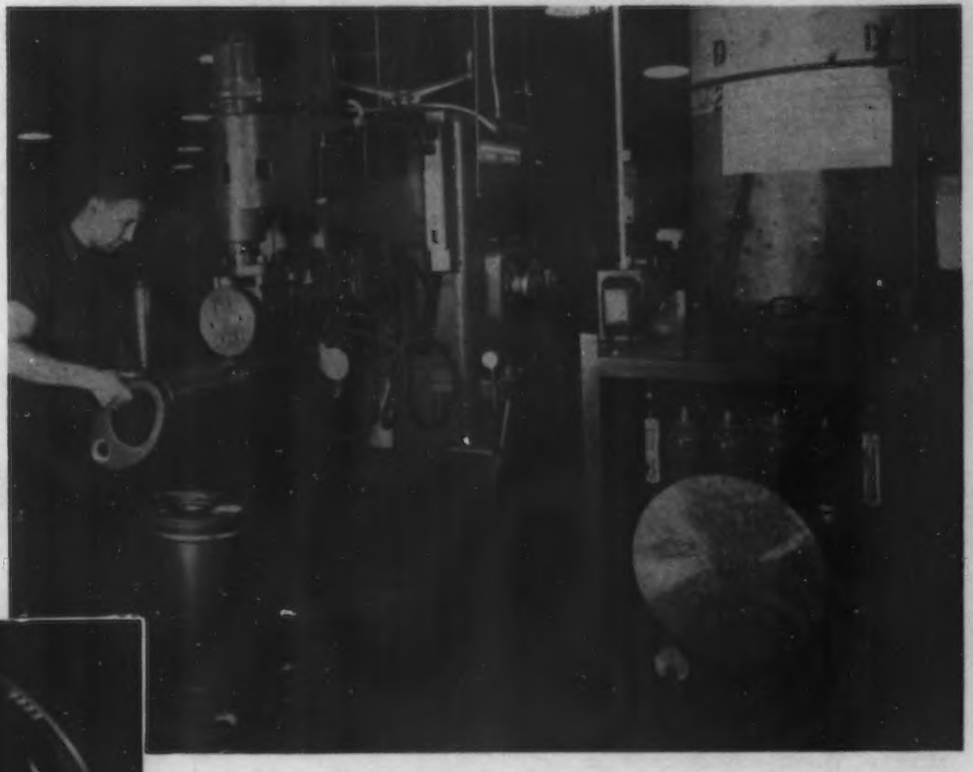

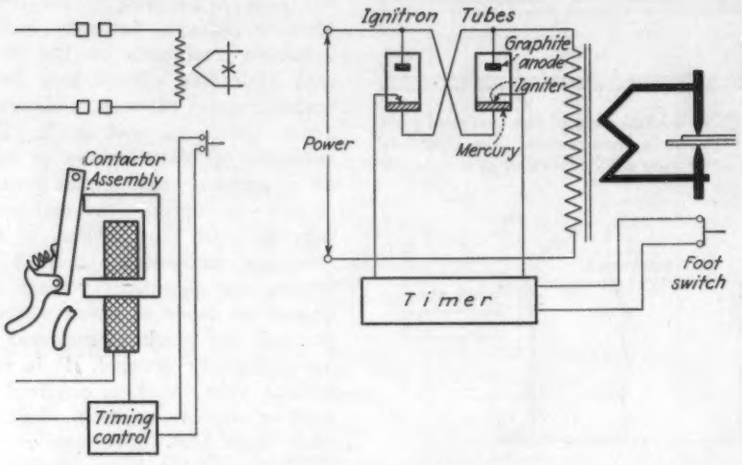

FIG. 7—Two timing methods with typical current and wattage wave forms. (A) Using timed contactor adjusted for 2 cycles but showing typical timing errors. Weld No. 1 total watt-seconds or heat input 193 per cent of correct 2 cycle timing heat. Weld No. 2 total heat 88 per cent showing serious inconsistency in heat input. (B) Using ignitron timer also adjusted for 2 cycles. Welds Nos. 1 and 2 are identical, showing consistency of timing and heat input.

type electrodes especially designed to weld compact although sometimes heavy parts. The power factor is little affected by the resistivity of the work.

There are several methods of applying pressure to the work but air at regulated pressure is coming more and more into favor since it provides reliable and accurate electrode pressure control together with convenient adjustment. Several other means, of either mechanical or combination air and mechanical nature, are often employed. Each of these has its merits for certain applications. As other variables, notably timing, have been subjected to precise control, it has also been necessary to refine the methods of controlling pressure.

Spot Welding

Spot welding is performed using stud-type electrodes with small area tips which concentrate both pressure and current for welding metal sheet or other semi-flat structures. Such a welding machine is shown schematically in Fig. 2A together with a cross-section of typical work. The pressure is first applied and when it reaches full value, current is turned on by the timer for a preset time duration. After the current is turned off, the electrodes again open.

Modern spot welding machines are often provided with repeat type control with which spot welds are automatically made in rapid succession, sometimes at the rate of two or more per second. This type of control merely repeats, at the desired rate, the sequence described in the preceding paragraph. In such welding, the operator closes the control switch and thereafter acts only to move the work after each individual spot weld when the electrodes open. Repeat control is often applied to the gun-type spot welder which is moved from weld point to weld point while the bulky sheet metal structure remains stationary. Gun welders are similar to ordinary spot welders except that the transformers are separately mounted and its secondary leads are flexible and 10 or 15 ft. in length. Thus the electrodes and pressure mechanism can be handled by the operator, sometimes using a counter-balancing device.

Projection Welding

Projection welding is essentially a form of spot welding utilizing a similar machine except having flat or die-type electrodes. Prior to welding, one or more projections of the desired shape and size are pressed in one or both work pieces. When power is applied, welds are made wherever the projections contact the mating work piece.

Fig. 2B shows one type of projection weld. The ignitron tube parts shown in Fig. 1B are joined with a vacuum tight projection weld which, in this case, is a complete circle. In projection welding, the weld area is determined by size of the projection rather than by electrode contact area.

Rather than make individual spot welds, several projections are often used as shown in Fig. 2B and all of them welded simultaneously. Labor costs are reduced although the instantaneous power demand is increased several hundred per cent.

Butt Welding

Butt welding is similar to projection welding except that no projection is raised on either part. Die-type electrodes are generally employed.

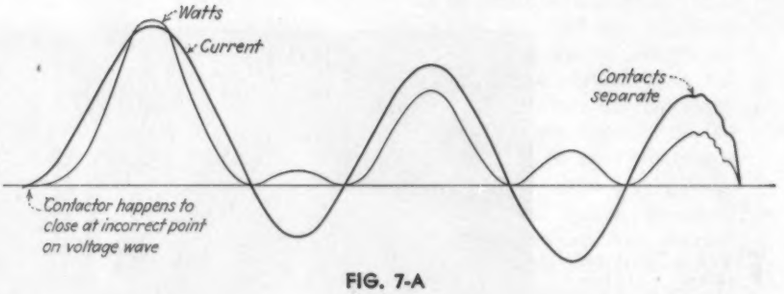

FIG. 7-A

Rods, for instance, are joined end-to-end by butt welding. Two lengths of pipe may be joined, as shown in Fig. 4 to form almost the equivalent of a seamless continuous pipe. The joints are neat in appearance, mechanically strong, pressure tight and have metallurgical properties almost identical with those of the parent metal. In manufacturing enamel ware, handles formed from thin sheet metal are butt welded to pots and pans prior to enamelling.

Seam Welding

Seam welding, sometimes called line, roller or stitch welding, consists of a long series of spot welds made in rapid succession on a wheel-type machine. Pressure is not removed between spots and the wheel electrodes move continuously. The individual welds may be spaced at some distance for high production speed seam welding in

which mechanical strength is only desired. More commonly, the individual welds overlap one another to form gas and liquid tight seams for vacuum or pressure tight vessels. Seam welding is of particular value in joining parts having flat or cylindrical surface over which a wheel can conveniently travel. Fig. 5 illustrates one method of welding bottoms into containers.

Lineal speeds up to 120 ft. per min. are being obtained with spot spacing of 3 in. This requires accurate 1/120 sec. timing of current at 480 interruptions per minute. Seam welds are made for liquid tight service at speeds up to 25 ft. per min. although from 12 to 18 ft. per min. is more typical for steel. Lineal speeds for aluminum and various alloys are usually less than half that of steel of the same gage.

Although continuous alternating current can sometime be used for seam welding steel, it is now generally recognized that even steel can be welded with superior results using current which is interrupted at a high rate of speed and with accurately timed regularity. Current interruption is usually essential to successfully seam weld aluminum, stainless steel and other alloys.

Ignitron timers, such as Fig. 3, operating in synchronism with the power source have proved eminently suitable for seam weld timing since time in cycles "on" and cycles "off" and their ratio to one another must generally be reproducible to a high degree of precision. Also, the interrupting device must be capable of enduring the high speed of operation necessary without undue maintenance. Interruption speeds in modern seam welding range from 250 to 2400 per min. Mechanical devices are entirely unsuited to such high speed service. The ignitron timer for seam welding is described in a later section of this paper.

Weld Timing

The timing of welding current is accomplished in one of several ways:

1—Manually timed magnetic contactor.
2—Mechanically timed magnetic contactor.
3—Electrically timed magnetic contactor.
4—Synchronous motor operated contactor.
5—Electron tube timers (not including contactors timed by tubes.)

The first three methods of timing are relatively inexpensive but their use is limited to the more readily weldable materials and also to spot, projection or butt welding. Inherent accuracy limitations often preclude their use in the new short-time welding with its exacting requirements.

The synchronous motor operated contactor may also be used for seam welding and is a relatively inexpensive method of obtaining a higher degree of timing accuracy than can be obtained with the first three methods mentioned. It has certain disadvantages, among which are non-flexible adjustment and the necessity of adjusting and maintaining the device to close and open its contacts at the exact zero point of the current wave. This zero point—the power factor—shifts as the work, especially steel, is fed into the throat of the welding machine. Also, proper maintenance is often difficult in practice, owing to mechanical wear.

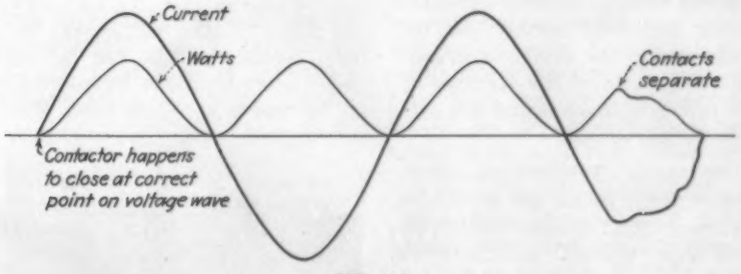

FIG. 7-B

Ignitron Spot Welding Timer

The ignitron spot welding timer, Fig. 3, has proved eminently suited to the requirements of precision spot, projection or butt welding (7). This timer inherently operates in terms of half-cycles or, in 1/120 sec. increments of welding current. It is designed and calibrated to apply power to the machine for a timed interval which is composed of an adjustable exact number of half-cycles within a range of from 1 to 30 or more cycles. High operating speeds are attained with thoroughly dependable reproducibility. If desired, timing may be adjusted in ½ cycle increments, although standard timers are calibrated in one cycle steps. Essentially, the power tubes serve as a single-pole, fast-acting switch operating noiselessly and without the usual arc burning. The primary current of the welding machine is carried and interrupted entirely by ignitron power tubes (4) (5) (6). No mechanical or electromagnetic device affects the accuracy of timing.

In common with all electron tubes, ignitrons are not subject to mechanical wear or arc burning. Fragile filaments are not employed in the ignitron which consists of a vacuum-tight inclosure of metal or glass in the bottom of which is a pool of mercury that serves as one electrode. A short distance above the mercury there is another insulated electrode, made of graphite. For the third electrode, and in place of a grid, an igniter or "spark plug" is employed. This igniter is insulated from the two main electrodes although partially immersed in the mercury pool. The ignitron will not conduct current until a small ignitron current is passed through the igniter to the mercury pool. The tube then instantly "arcs over" and becomes

(CONTINUED ON PAGE 81)

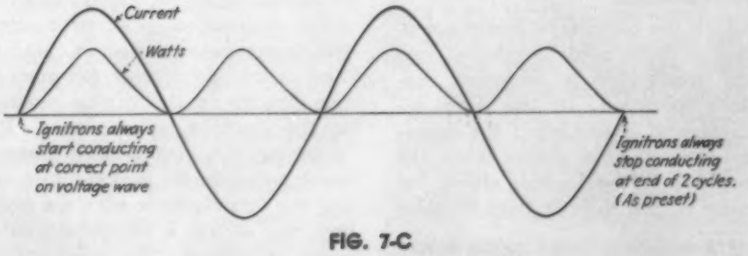
Current
Watts
Ignitrons always start conducting at correct point on voltage wave
Ignitrons always stop conducting at end of 2 cycles. (As preset)

FIG. 7-C

Installs New Production Line For

SOCKET for rigid conduit mounting with is self-supporting and requires no further mounting details.

By R. E. MILLER

° ° °

DETACHABLE watt-hour meters that can be plugged into a circuit with somewhat the same ease as an electric iron or other household appliance have been in production at the Newark, N. J., plant of the Westinghouse Electric & Mfg. Co. for the past 5 years. They are made largely for public utilities. Mounted on the outside of residences and other buildings, they permit the reading of meters without disturbing the subscribers.

Recently* the same principle has been applied to other types of instruments, types that find wide application in connection with machine tools and other motorized machine equipment. In function these plug-in instruments are identical with the previous panel-type, but are mountable directly in the wiring conduit and provide a plainly visible and unusually flexible means of determining any desired load condition.

Like the panel-type instruments, they may be used to prevent loss and waste due to improper machine operation. By the visual indication of power input the operator can tell at a glance when the machine is overloaded, either because of dull tools or from troubles in the machine, the motor, control or wiring. Thus not only is undue power consumption prevented, but slowing down of production due to dull tools, or complete interruption of production due to breakage of tools or of machine parts can be avoided. Electrical instruments can also be used to show the speed at which the various machine units are operating, relative to each other, and even the position of various machine units in the operating cycle.

All types of the new detachable instruments use standard watt-hour meter parts, manufactured on a high-output, low-cost basis. The development of detachable watt-hour meters and instruments has required an expansion of manufacturing facilities, notably for the production of the socket or mounting unit. Some of the features of this new production layout are outlined in this article.

Component members of these plug-in instruments are shown in Fig. 1. There are two main units, namely, (1) the instrument mechanism which is mounted on a plate and has electrical-connection blades on the back, and (2) the socket or mounting device which has electrical connection jaws to receive the instrument connection blades. The socket is designed for mounting directly in the wiring conduit at the machine, or elsewhere. By plugging the glass-housed instrument unit into the socket and sealing the two together with the sealing ring shown, a complete instrument is formed. The combination

The instrument may be an ammeter, voltmeter, watt meter, power factor meter or various specialty instruments now in process of development, such as total-hour meters, position indicators, or speed indicators. Any of these can be quickly removed and replaced in the same socket. Standard "troughs" (all-metal boxes) having several sockets can be used when more than one instrument is to be read at the same time. When

FIG. 1—Component members of the new plug-in wiring conduit and the instrument unit is plugged ring shown at

*Announced in April 29 IRON AGE, page 59.

Detachable Instrument Sockets

rigid connection jaws and instrument unit.

detailed analysis of a motor is desired, the instrument can be replaced by plug-in testing jacks with cable connections to permit use of a complete portable analyzer (see Fig. 4). Furthermore, continuity devices are available so that these plug-in sockets, located either at the machine or elsewhere in a conduit line for future use, may be sealed off until wanted.

Two types of the plug-in socket or receptacle are made. One is in the form of a die-cast ring for mounting integrally in the frame

electrical instruments. The socket mounts in the into it. The two are then sealed together by the the extreme right.

of a machine at the factory, and the other, shown in Fig. 1, is a die cast socket for installation in the pipe conduit that carries the wiring to the motor. It is the latter that is mainly dealt with here.

Socket Production Continuous

Production of the sockets is continuous, from the feeder sections to sub-assembly and main assembly benches. Completed units travel a very short distance by roller conveyor to packers, who box them for shipment or stock.

The socket member is an aluminum die casting about 7 in. in diameter and has bosses on the interior, as shown, for reinforcement of the conduit assembly. The first operation, done in a feeder section immediately adjoining the main and sub-assembly benches, is the drilling and tapping of eight or more holes, two or more for connection to the conduit, four terminal block mounting holes, and two holes for wall mounting. This is done on the Kingsbury drilling and tapping machine, Fig. 2, equipped with four tapping units arranged to tap all holes simultaneously, each unit going through its cycle and then stopping. Each unit contains an air cylinder for tripping the feed and all four cylinders are connected to one control valve. These tapped holes for the conduit connections may be ¾, 1 or 1¼ in. in diameter, and sockets with either two or three-way tapped outlets can be furnished.

This Kingsbury machine is equipped with one of the new detachable instruments, in this case an ammeter, by means of which the condition of the taps and other tools is closely watched in order to avoid poor workmanship and the slowing up of this operation.

When tapped, the sockets slide by gravity to a conveyor that takes them through a washing machine and a drying oven. They then go to a spray booth for lacquering, a priming and a final coat being applied. The lacquered sockets then pass to another drying oven, of vertical or ferris-wheel type, and then to the first of a series of assembly operations.

Terminal Blade Jaws Made at High Rate

As previously mentioned, the socket member contains within it a set of heavy-duty connection jaws that receive the mating electrical connection blades of the instrument unit. These, together with the terminals for connecting the external or load circuit are carried on a Moldarta molded composition terminal block.

Terminal blade jaws are made at a high rate on U. S. Tool Co., No. 33 multi-slide machines (see Fig. 3). Phosphor-bronze strip stock 0.047 in. thick and about ¾-in. wide is pulled from a stock reel through a straightener, the stock then passing successively through a series of dies. It is first pierced, formed and cut-off; then picked up by another tool and further formed in three successive operations. Finally, a vertically operated stripper ejects the piece into a tote

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FIG. 2—High production drilling and tapping of the socket member, an aluminum die casting. One of the new detachable instruments is regularly used on this machine for determining when the taps and drills need resharpening.

o o o

box through the base of the machine.

The same battery of high production machines is employed for making the sealing ring bracket, shown at the lower right in Fig. 1. These are made from brass stock 1/16 in. thick and 1⅜ in. wide. Successive operations are: Piercing two holes and three slots, countersinking the two holes, blanking and returning the blank to the strip, cut off, and forming to shape.

The machines doing these complicated power press jobs are entirely automatic. In effect, they comprise a number of shafts surrounding the main machine bed: from these shafts horizontal and vertical slides are operated by means of cams or eccentrics, as the work requires. The shafts are gear driven, and changes in production speeds to suit different set-ups are accomplished merely by changing the gears.

Terminals Made on Screw Machine

An outstanding machining operation is in the production of the terminals for connecting the external or load circuit. These are made from ½ in. diameter brass rods on a Davenport five-spindle automatic screw machine especial-

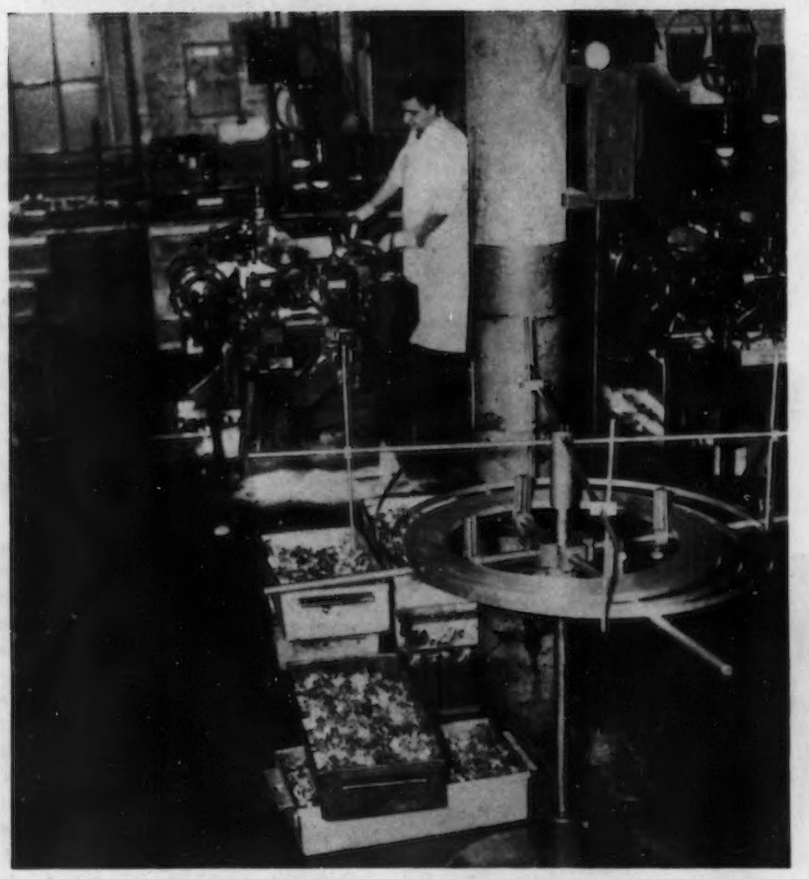

FIG. 3—Contact terminals for the plug-in sockets are produced at a high rate on multi-slide automatic machines. From the reel, the phosphor-bronze strip stock goes through a straightener and then through a series of piercing and forming dies.

ly tooled for the job. Operations are: Drilling and tapping; cross drilling on the end; turning down to size; threading; and broaching of the shoulder to prevent turning in the assembly. These pieces have to be held within a few thousandths of an inch, particularly on the threaded portion. Subsequent processing includes cleaning in a potash solution for removing oil, bright dipping to remove scale, and tin plating, the latter done for the most part in barrels.

Other feeder sections manufacture the sealing ring and the instrument mechanism backing plate, both of which, with the parts mentioned above, end up in the assembly and packing departments.

The sealing rings are made from tinned copper strips. A punch press with coil-feed blanks, pierces and countersinks holes in the strip stock, which is subsequently cut and formed into rings, the latter on a conventional horizontal milling machine equipped with an ingenious special fixture and a special rolling tool. The milling machine is used principally as a convenient means of variable-speed drive.

The instrument backing plate, which forms the base or foundation for mounting the instrument elements, is blanked and formed in a Bliss No. 306 straight-sided press equipped with suitable combination blanking and forming dies. It is made of strip steel stock, 0.62 in.

ABOVE

FIG. 4—A number of power presses at the Newark plant have also been equipped with plug-in type ammeters to permit convenient check on how stock is running with respect to thickness and hardness and when the tools need resharpening. In this case the ammeter has been replaced by a test jack with cable connection to a portable industrial analyzer for making complete analysis of motor operation.

BELOW

FIG. 5—Assembling the terminal blocks. All assembly operations have been time and motion studied and equipment provided to assure maximum economy of time and effort.

FIG. 6—Sealing ring assembly. Special pipe racks, convenient to the hands of the operators, provide temporary storage, and permit transporting the rings in bulk loads.

thick, about 8 in. wide and 10 ft. long.

Several of the presses in this department are equipped with one of the new detachable instruments. In the case of the machine shown in Fig. 4, an ammeter is regularly used as a means of telling what load the machine is drawing, any inconsistency of operation being immediately known. In this way the operator can determine when tools need replacing or see how his material is running with respect to thickness or hardness, etc. In the illustration the ammeter has been temporarily removed and replaced by a test jack with cable connection to a portable industrial analyzer for making a complete analysis of motor operation. With the test jack connection, the analyzer can be used merely by plugging it in, without special wiring or breaking of the circuit.

Assembly Operations Progressive

Completed parts go directly from the press, screw machine, plating and other feeder sections to the assembly departments by means of industrial trucks, and are transferred to the various assembly benches on skids by electric lift trucks.

Assembly operations are progressive. Not only are the routing, the handling, and the fixtures and other tooling the result of careful study, but all individual operations have been time and micro-motion studied to assure maximum comfort for assemblers as well as for maximum operating economy.

Assembling the parts of the Moldarta terminal blocks is perhaps the most intricate of the final operations. It begins with a sub-assembly of the terminal connectors. The operator preloads and pre-positions the screws and lock washers in a special fixture on a high-speed motor-driven vertical screw driver. The screws are then tightened to a predetermined pressure which is automatically taken care of in the set-up of the tool.

The assembled connectors then pass to another bench (Fig. 5) for final assembly of terminals and

(CONTINUED ON PAGE 82)

FIG. 7—The operator at the right assembles completed terminal block to the plug-in socket base by means of a special high-speed, four-spindle screw driver. Finished units are placed on the rotatable shelves. Inspectors, shown at left, then hand check each screw for tightness.

How and When To Make Use Of Gear Reducers

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By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

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CHAPTER 22 in a Series on the Economics of Industrial Power Transmission.

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THIS is essentially an era of high speed prime movers. The steam turbine, operating at high speed, is far more efficient than the low speed reciprocating engine. The small high speed motor is more efficient, just as powerful, and less costly than its larger, low speed brother. In the eagerness which has developed to use these more efficient power units, industry has posed a problem of great importance to transmission equipment manufacturers, because the machines of industry do not operate at the high speeds characteristic of the newer prime movers.

It is seldom practical for any one set of belts and pulleys to operate at a higher reduction than 6 to 1, or for any one set of chains and sprockets at a higher ratio than 8 to 1. Open gears are subject to grave disadvantages in many places, even though the reduction ratios possible through their use are almost without limit. With a natural desire to secure the utmost efficiency in the actual transmission of power from driving to driven mechanism, has come the need for enclosing all moving mechanisms which normally present an aspect of danger to the human operators, and the requirement that the transmission equipment be compacted into the smallest amount of space possible.

To secure within limited space and with high efficiency the high ratios of speed reduction required to adapt high speed prime movers to low speed machines, gear reducers, completely enclosed and therefore easily lubricated and kept free from dirt and grit, have been developed for practically every industrial drive condition. Gear reducers are positive in action; reduction ratios are always constant; and the unavoidable loss of power in transmission is very low as compared with any other method of obtaining the same results.

Like all other items of industrial power transmission equipment, judgment must be exercised in the selection of any gear reducer for a specific job. It is not possible to get the most satisfactory service from any one type of gear reducer under every condition of application. Some types are better for certain jobs than others. There are three broad types of gear reducers: Spur gear, helical or herringbone gear, and worm gear. Bevel gears may be built into any of these units, and combinations of any two types may be made; changing materially the fundamental characteristics of the simple units. Any analysis of the applications of gear reducers, however, should be based first on the characteristics of the simple units; then the various combinations may be compared more readily and a logical selection for a particular job made intelligently.

Five major considerations enter

UNIFORM LOAD		MODERATE SHOCK LOAD		HEAVY SHOCK LOAD
Agitators Liquid Semi-Liquid	**Fans (Uniform Speed and Balance)** Light Centrifugal Propeller	**Beaters** Pulp	**Feeders (Pulsating Loads)** Apron Belt Screw	**Compressors** Reciprocating (single or two cylinder)
Bottling Machines	**Feeders** Disc type	**Blowers** Lobe	**Hoists** Reversing Skip	**Conveyors** Reciprocating Shaker
Bleachers	**Generators**	**Car Pullers**	**Kilns** Cement Lime	**Crushers** Ore Stone
Blowers Centrifugal or Vane	**Kettles** Brew	**Compressors** Centrifugal or Rotary Reciprocating (3 or more cylinders)	**Mills** Ball Pebble Rubber Sheet	**Dredge Cutter Head**
Conveyors (Uniformly loaded or fed) Apron Assembly Belt Oven Screw	**Line Shafts** Light	**Conveyors** (Heavy duty or dual drive, rough and non-uniform material) Apron Belt Live roll Screw	**Mixers** Dough	**Feeders** Reciprocating
Cookers Cereal	**Machine Tools** Light	**Draw Bench**	**Pumps** Reciprocating (3 or more cylinders)	**Jordans**
Can Filling Machines	**Mash Tubs**	**Dryers** Rotary	**Screens** Rotary, gravel or stone	**Mills** Hammer Rod Rubber Calender
Elevators, Bucket (Uniformly loaded or fed) Centrifugal discharge Gravity discharge Continuous bucket	**Mixers** Liquid Semi-liquid	**Elevators** Heavy duty bucket Freight	**Stock Chests**	**Pumps** Reciprocating (single or two cylinder)
	Pumps Centrifugal Geared Rotary	**Fans** Large mine Induced draft	**Textile Machinery** Looms	**Punch Presses**
	Screens Air Washing Traveling water, intake		**Wire Drawing Machines**	
	Stokers			
	Textile Machinery Cards			

FIG. 1—Classification of Common Machine Loads for Gear Reducer Service.

into the problem of gear reducer selection:

1. The relation of driving shaft to driven shaft.
2. The service factor of operation.
3. The common limitations of ratio and capacity of the various units available.
4. The relative efficiencies of the various units available.
5. The costs involved.

In any problem involving the selection of a gear reducer for a particular job these five considerations should be examined in detail, and in the light of the data thus obtained, comparisons made between the different types of units available. This discussion will treat briefly the usual data entering into each step of the problem for direct-coupled jobs only; a later discussion will treat of the conditions under which a gear reducer is to be used in conjunction with chain or belt drives, with an unbalanced, overhung load on the reducer output shaft.

Shaft Positions

The first consideration in the selection of a gear reducer is based on the relation of driving shaft to driven shaft. There are three conditions of shaft position, and in each of these, three conditions of speed relationship, as follows:

A. Both shafts are in the same line.
   a. For low ratios, simple spur gear units are generally indicated.
   b. For medium ratios, compound spur gear units are generally indicated.
   c. For high ratios, compound spur gear units or compound helical or herringbone units are generally indicated.

B. Both shafts are parallel.
   d. For low ratios, simple helical or herringbone gear units.
   e. For medium ratios, compound helical or herringbone gear units.
   f. For high ratios, compound helical or herringbone gear units, or compound worm gear units.

C. One shaft "turns a corner" with respect to the other.
   g. For low ratios, simple bevel gear units or worm gear units, or combinations of bevel and spur gear, or bevel and helical or herringbone gear units.
   h. For medium ratios, worm gear units, or combinations of bevel and spur gear, or bevel and helical or herringbone gear units.
   i. For high ratios, combinations of worm gear and helical or herringbone gear units.

These suggestions are *not* absolutely definite. Often the field of usefulness of one type of unit will overlap considerably into other fields. In general, however, it will be found to be a fair guide in the first step of selection, and may be taken as indicating common practice unless overruled by certain of the other considerations to follow.

Service Factors

The second consideration in the determination of any gear reducer is the determination of the character of the load imposed on the

Character of Load on Driven Machine	SOURCE OF POWER								
	Electric Motor Drive			Multi-Cylinder Gas or Steam Engine or Turbine			Single Cylinder Gas Engine		
	Intermittent 3 hrs. per day	8-10 hrs. per day	24 hrs. per day	Intermittent 3 hrs. per day	8-10 hrs. per day	24 hrs. per day	Intermittent 3 hrs. per day	8-10 hrs. per day	24 hrs. per day
Uniform	.8	1.0	1.25	1.0	1.25	1.5	1.25	1.5	1.75
Moderate Shock	1.0	1.25	1.5	1.25	1.5	1.75	1.5	1.75	2.0
Heavy Shock	1.5	1.75	2.0	1.75	2.0	2.25	2.0	2.25	2.5

FIG. 2—Service Factors for Gear Reducer Service.

driven mechanism, and the nature of the power flow in the driving mechanism. Both together form a measure of the kind of service which the reducer unit must accommodate, and taken together determine a "service factor" to be used in interpreting the rating tables published by each gear manufacturer in his catalog.

These rating tables represent, according to accepted formulas of the American Gear Manufacturers Association, the mechanical horsepower capacity of each unit at various reduction ratios, and at various input shaft revolutions per minute on service applications not exceeding 8-10 hrs. duty per day, where the driving mechanism is an electric motor, and the driven load is uniform.

Manifestly, conditions other than these will affect the capacities of the units one way or another. To simplify the problem of selection, and at the same time to insure the selection of a unit of sufficient capacity to meet the service demand, the published ratings for any reduction unit should be *divided* by the appropriate service factor to determine the safe capacity under other conditions of use. For helical and herringbone gear units, and for worm gear units still another factor is mentioned in the rating tables: thermal capacity. This figure represents the highest amount of power the unit should be expected to transmit in continuous service, and is based on adequate dissipation of the heat generated within the unit.

Service conditions imposed by machine loads are classified by the table in Fig. 1 as uniform load, moderate shock load, and heavy shock load. In the table of Fig. 2 these loads are used in conjunction with three types of power flow from the driven mechanism to determine appropriate service factors under three types of duty—normal 8-10 hrs. per day continuous operation; subnormal intermittent operation totaling not more than three hours per day; and abnormal, continuous 24 hr. duty.

It should be noted that not all manufacturers of gears recognize so many influences in the tabulation of service factors applying to their published ratings. Nevertheless, they represent conservative averages, and it will be safe to take them all into consideration regardless of the method of calculating the ratings.

Use of Rating Tables

In using these service factors, the problem of selection may be most easily approached by determining first the *actual* horsepower requirement of the mechanism to be driven (not the rating of the motor or other prime movers), and *multiplying* that figure by the appropriate service factor to obtain the equivalent service horsepower required in the reducer unit. Then, with the desired ratio of reduction and the speed of the reduction gear input shaft known, the unit to be selected will be one with a horsepower capacity equal to or slightly larger than the equivalent service horsepower as above determined.

For instance, for moderate shock load, 8-10 hour per day service, it is required to choose a reducer to transmit 120 hp.; the motor speed being 1150 r.p.m. and the speed of the driven shaft 320 r.p.m. The service factor is 1.25; consequently the equivalent horsepower capacity must be 120 x 1.25, or 150 hp. The ratio is 1150 divided by 320, or 3.6 to 1. In the rating tables look for the nearest standard ratio to 3.6 to 1, and under an input shaft speed of 1150 r.p.m. for a unit with a capacity equal to, or slightly larger than, 150 hp. If that capacity does not exceed the thermal capacity of the unit at that speed the unit will be ample for the duty required.

Or, assume a direct coupled conveyor drive, 8-10 hours per day operation with uniform load, driven from a 5 hp. motor of general purpose characteristics, through a single reduction worm gear reducer. The headshaft speed is 40 r.p.m. and the actual headshaft load is 3.5 hp. The service factor is 1.0; consequently the equivalent horsepower capacity is the same as the actual load. The ratio is 1750 r.p.m. divided by 40 r.p.m., or 43.75 to 1. At this ratio a single reduction worm gear reducer has an efficiency of 79 per cent. Consequently the power input required by the unit will be 3.5 divided by .79, or 4.45 hp. The 5 hp. general purpose motor will therefore be ample to take care of the drive. In a table of single reduction worm gear ratings a certain size unit is found to have a capacity of 4.8 hp. at a ratio of 45 to 1 when the worm shaft

GEAR REDUCERS AT A GLANCE

(Average Limits of Ratios and Direct-coupled Capacities in Common Practice)

	Planetary Spur Gear		Non-Planetary Spur Gear		Helical or Herringbone Gear		Worm Gear	
	Ratios	Cap.	Ratios	Cap.	Ratios	Cap.	Ratios	Cap.
Single Reduction	4 : 1 to 10 : 1	Fract. to 150 hp.	4 : 1 to 7 : 1	Fract. to 150 hp.	1.5 : 1 to 10 : 1	1.5 to 610 hp.	4.5 : 1 to 100 : 1	3.5 to 164 hp.
Double Reduction	10 : 1 to 100 : 1	Fract. to 100 hp.	7 : 1 to 20 : 1	Fract. to 100 hp.	10 : 1 to 70 : 1	.75 to 575 hp.	25 : 1 to 10,000 : 1	3.5 to 36.5 hp.
Triple Reduction	100 : 1 to 500 : 1	Fract. to 25 hp.	20 : 1 to 35 : 1	Fract. to 90 hp.	70 : 1 to 350 : 1	.5 to 235 hp.		
Quadruple Reduction			35 : 1 to 50 : 1	Fract. to 75 hp.				

Note: Spur gear reducers noted are for driving both shafts in line. Right-angled drive may be had with built-in bevel gears. Spur gear reducers can operate as increasers, provided the ratio does not exceed 4 to 1.

Helical and herringbone gear reducers noted are for parallel shaft driving. Right-angled drive may be had with built-in bevel gears. In double reduction types both shafts may be in line.

Worm gear reducers noted are for right-angled drives in single reduction, and for parallel shaft drives in double reduction. Helical or herringbone gears may be built-in at high speed end of single reduction types for moderately high reduction ratios.

When two or more gear sets are thus compounded, the resulting ratio is the product of both ratios, and the total power transmitting capacity is that of the weakest element. Any gear reducer may be used with a chain-and-sprocket drive to secure a further increase in ratio, but capacities must then be figured in inch-pounds of torque, and by comparison are less than direct-coupled capacities.

FIG. 3—Gear Reducers at a Glance. Limits of Ratios and Capacities.

(input shaft) is turning at 1750 r.p.m., and a thermal rating of 5 hp. This particular unit will be ample for the job.

Note that in this last example "efficiency" has been considered. Efficiency is the ratio of power input to power output, and measures the extent of the power transmission losses in the driving mechanism. Knowing the equivalent power required by the driven mechanism, the efficiency of the reduction unit enables us to calculate the amount of power which must be furnished by the prime mover, and hence measures the capacity which the reduction unit must accommodate. In other words, the capacity of the reducer must be taken, not as the load to be driven, but as the amount of power which the prime mover is required to furnish to drive both the reducer and the load.

Again, fast-turning input shafts combined with low ratios of reduction give a theoretical mechanical horsepower capacity which may be far in excess of the thermal capacity. For intermittent use over short periods these theoretical mechanical capacity figures may be safely taken; otherwise the thermal capacity provides a limit beyond which the mechanical capacity figures should not be used.

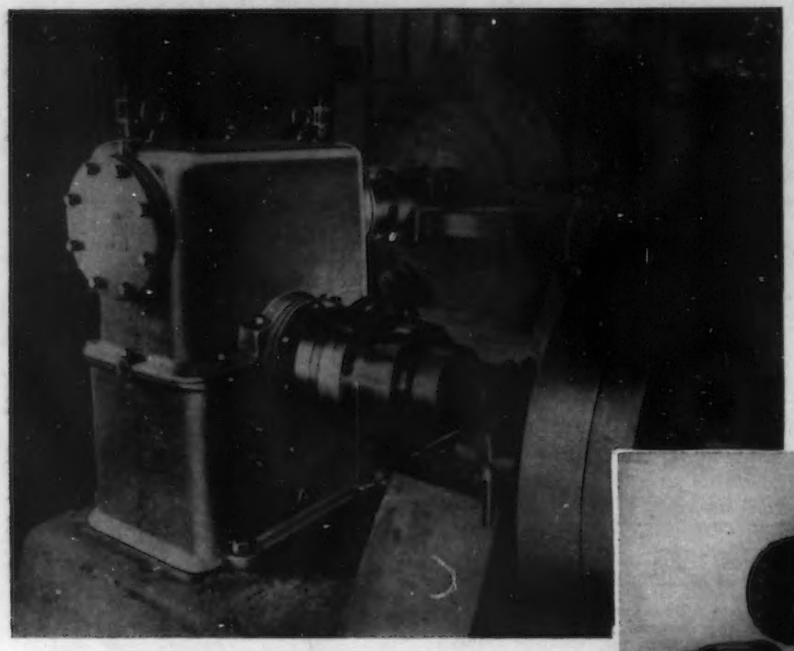
Ratio and Capacity Limits

The third consideration in the selection of a gear reducer involves the limits of ratios and capacities available for various units, and the efficiencies of use. In a very generalized form, subject to minor changes as contained in the rating tables of different gear manufacturers, the table in Fig. 3 shows at a glance how ratios and capacities vary for the simple forms of gear reducers in various reductions.

All gear reducers deliver less power in proportion to input at low input shaft speeds, and efficiency likewise drops at high ratios of reduction as compared to low. This is due, of course, either to the multiplication of gears required for the higher reduction ratios, or to the increased amount of tooth-contact and bearing pressure, or both. For example, a double reduction non-planetary spur gear reducer at a ratio of 18 to 1 is nominally rated at 7.5 hp. at 1200 r.p.m. input shaft speed. At 1800 r.p.m. and the same ratio it will deliver 11 hp. The same unit operating at a 14 to 1 ratio and 1200 r.p.m. is rated at 10 hp., but if the input shaft speed is stepped up to 1800 r.p.m. the capacity will be 14.6 hp.

Or, in the case of a single reduction worm gear unit, a 30 to 1 ratio at 1200 r.p.m. will deliver 5.8 hp., and at 1800 r.p.m., 7 hp. The same unit at a 59 to 1 ratio and 1200 r.p.m. will deliver 3.1 hp., or at 1800 r.p.m., 3.7 hp.

Consequently the most efficient unit, from the standpoint of the amount of power transmitted, will be that one which, under the required conditions of reduction ratio and input shaft speed, delivers the highest percentage of the power delivered to it by the prime mover. Efficiency may not be the controlling factor in the selection of a low-powered unit, but as the power transmitted becomes larger, it becomes an increasingly important influence. It is therefore well to insist on getting some reasonable idea of the varying efficiencies of reducer units when comparing the desirability of one type with another for a particular job. Many rating tables do not take cognizance of the efficiency factor openly. In such cases it is necessary to do quite a bit of digging to analyze the operating characteristics of a particular reducer unit. Fortunately a majority of gear manufacturers



ABOVE

FIG. 4—A Cleveland Worm Gear unit driving a fan from a high speed turbine.

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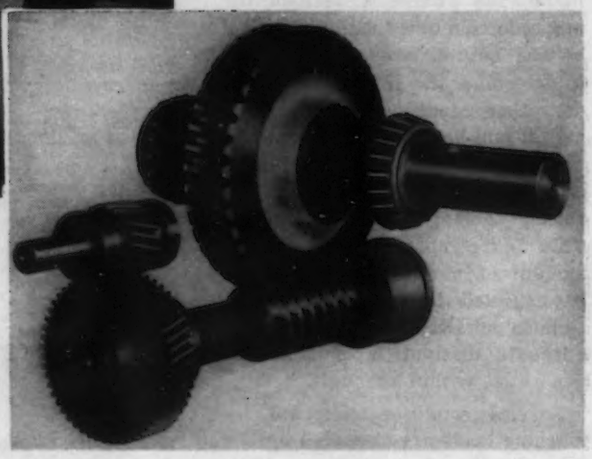

AT RIGHT

FIG. 5—A Horsburgh & Scott combination of helical gear and worm gear as built into a single reduction unit.

subscribe to the descriptive methods of the AGMA rating tables, and from such tables it is possible to deduce the necessary data. It will be desirable however to indicate in general the usual limits of efficiency obtainable for the various types of units, with the mental reservation that in special cases many manufacturers have found it possible to exceed them slightly.

Spur Gear Limitations

Spur gear reducers equipped with accurately cut gears and high grade antifriction bearings should operate, at most favorable ratios and with high input shaft speeds about as follows:

Single reduction .....98 per cent
Double reduction .....96 per cent
Triple reduction.....almost 94 per cent
Quadruple reduction...over 90 per cent

Spur gear reducers are generally preferred where it is desirable, or necessary, to keep both driving and driven shafts in line. There appear at present to be definite limits to the power capacity of spur gear reducers; 150 hp. in single reduction being the largest size commonly used, with the maximum ratio in this size 10 to 1. Spur gear reducers may be operated as increasers provided the ratio does not exceed 4 to 1. Excessive torque and the great amount of power required for starting prevents their use as speed increasers at higher ratios.

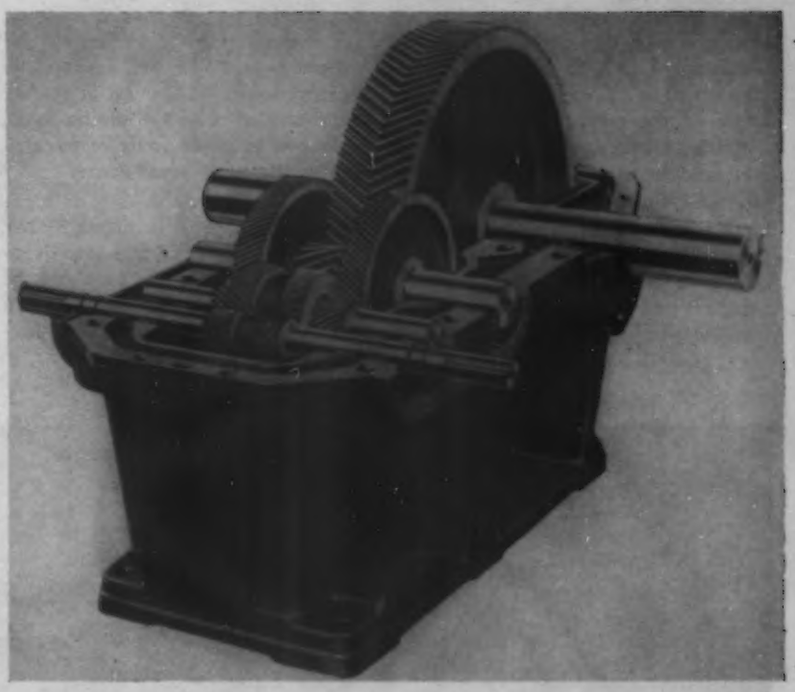

FIG. 6—Open view of Falk triple reduction herringbone gear reducer.

Spur gear reducers are frequently built into machines as integral parts thereof because of their compact arrangements and straight line drive characteristics.

Helical and Herringbone Limitations

Both helical and herringbone gear reducers should operate at most favorable ratios and high input shaft speeds about as follows:

Single reduction .....97 per cent
Double reduction .....95 per cent
Triple reduction .....92 per cent

Helical and herringbone gear reducers, while adaptable to all capacities and ratios of reduction within their limits, are particularly suited for the transmission of

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FIG. 7—Rust-proofing machine driven by Link-Belt variable speed transmission and worm gear reducer.

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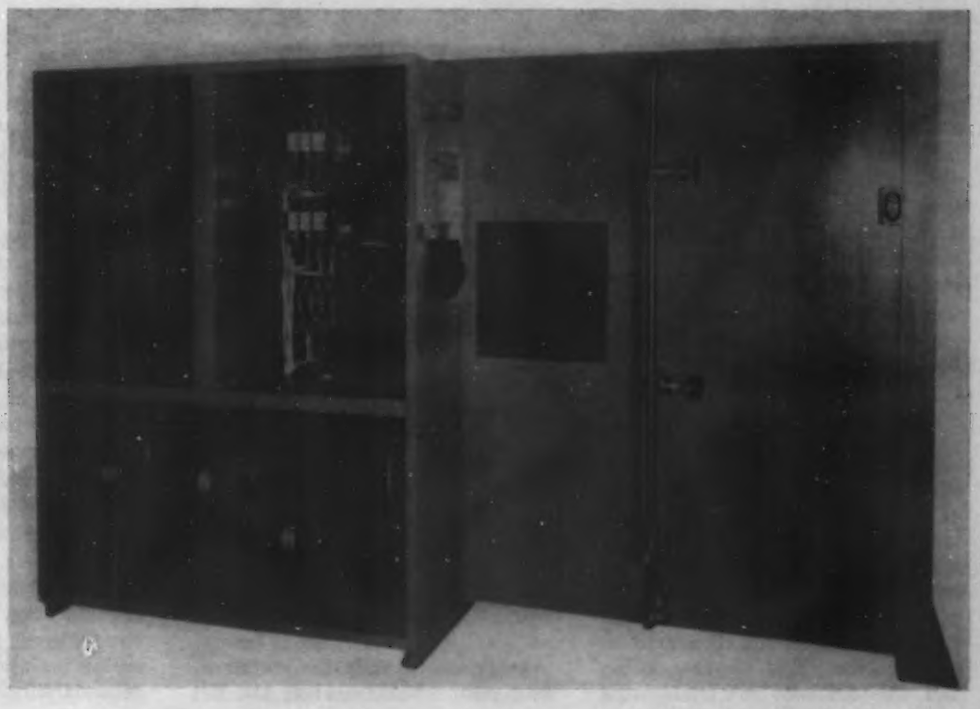

heavy powers at low ratios. As compared with spur gears, the extreme length of the teeth and the angle of the teeth, together, give a much larger area of tooth contact, and more teeth in contact at any one time. Consequently the tooth pressures for relative powers transmitted are much less. As compared with worm gears, which are primarily adapted for the transmission of low and medium powers at high ratios of reduction, there is considerable more rolling and less sliding action, which makes for greater efficiency at high powers. Because of the extremely rigid type of construction, helical and herringbone gear reducers are widely used where starting torque is high and shock loads are frequently met. The herringbone type of reducer may be employed in the lower ratios as an increaser.

Worm Gear Limitations

In very limited space a worm gear reducer provides a large ratio of reduction, but capacities are fairly limited. Worm gear reducer worms may be operated at higher speeds than any other form of reducer input shaft. Above 2000 r.p.m. however, the unit should be water-cooled. Due to the design and the different materials used for worm and gear, worm gear reducers provide self-correction against wear. Although primarily right-angled drive mechanisms, they can be made to drive parallel shafts, through bevel gears.

Efficiencies drop rapidly at higher ratios, starting at about 97 per cent for ratios of 4.5 to 1, and dropping quite uniformly to about 58 per cent for ratios of 100 to 1. An old rule-of-thumb method for judging the efficiency of single reduction worm gears is to subtract half the ratio from 100. For a ratio of 25 to 1, subtract 12.5 from 100. The efficiency is 87.5 per cent—which checks very closely.

Costs

The final consideration in the selection of a gear reducer is the cost. Due to the many excellences of design, materials and workmanship, there is really very little difference today in maintenance costs for the different types of reducers available. Consequently the whole item of cost may be compared on the basis of investment and installation. Now, curiously enough, throughout the middle range of powers and ratios of all types of reducers, there is little to choose between all types in the matter of first cost. For instance, the list price of a 10 hp. 10 to 1 ratio, 1750 r.p.m. input shaft speed reducer, single reduction, in each type will be about $300, plus or minus two to three per cent. In the low powers spur gear reducers are apt to cost least; in the high powers, herringbone gear reducers are apt to cost most. Therefore the item of cost really comes down to the question of installation. Which reducer will best fit the existing conditions, so that it may be installed at the least expense, is the vital question here. And that question is so wrapped up in all the previous considerations that, in the final analysis, the whole question of the differences in costs between one type of gear reducer and another amounts to very little in comparison with the problem of making the most effective adaptation of a unit to the job in hand. In fact there is probably no other type of power transmission equipment in which the question of the purchase price of the equipment involved makes so little difference in the final solution of the problem, as in the case of gear reducers. The true economics of the problem involve the factors of adaptation to the job, good service, efficient transmission of power, low maintenance, and, above all, dependability under all conditions.

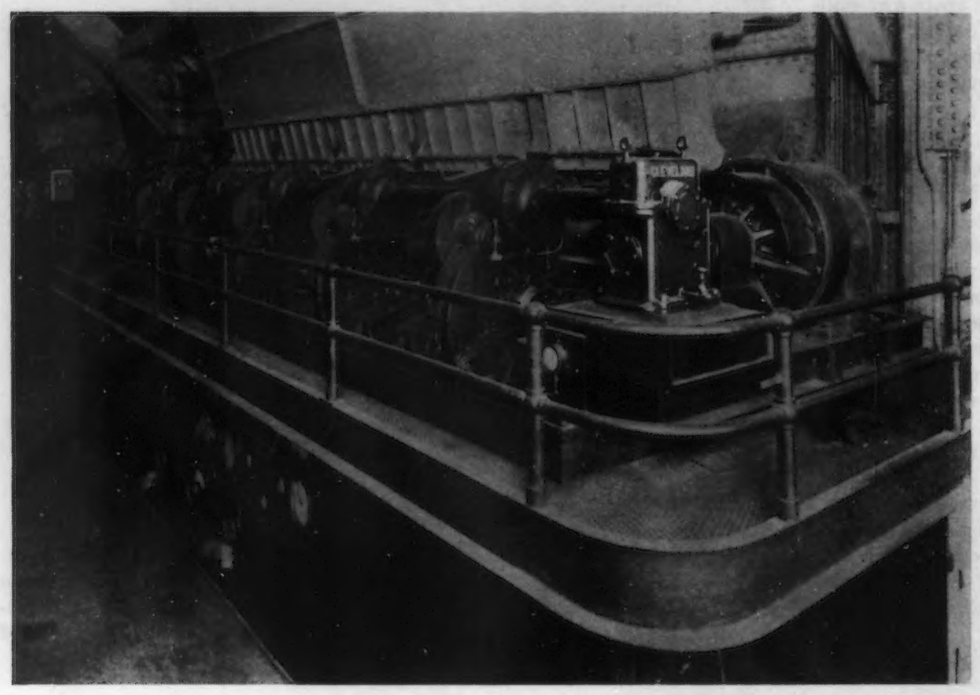

FIG. 8 — Worm gear compactness illustrated by a Cleveland unit driving stokers.

European Aircraft Production Equipment*

By HENRY A. BERLINER
Engineering & Research Corp.

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IT is my opinion that, generally speaking, the more advanced European countries are producing the component parts of their airplanes more efficiently than we are ours due to superiority of equipment. On the other hand, their time of assembly seems considerably more due to the superiority of American design. Workmanship on U. S. aircraft is better than that of any other nation, due to a greater proportion of skilled labor and better material. Aluminum alloy sheet, forgings, extrusions and castings are far better in this country than in Europe.

Presses

One of the primary problems of aircraft manufacture is the production of large double curvature metal surfaces. In this country we find zinc-lead dies and wood-rubber dies used in hydraulic presses and drop hammers. In Europe, on the other hand, where large quantities are required, we find wood dies faced with steel employed on flanged parts, and for large curved surfaces we find cast iron dies employed. These cast iron dies are simply hand finished, and sometimes a dummy press is used to match the male and female dies. The presses employed are mostly hydraulic, although crank presses are used for very large production. In addition, there is known as a drawing-stretching press in Germany, or more simply in England a stretching press. Briefly, it consists of one or more hydraulic cylinders mounted between two sets of clamping jaws. The metal to be formed is placed in the jaws, and a male wooden form on the hydraulic ram is then forced upward, which causes the metal to stretch. Sometimes a small amount of hand hammering is required. While it is obvious that such a tool is not so fast as double-action hydraulic or crank presses, it is equally evident that the cost of forms is much less than other die costs.

It is sometimes necessary to anneal after stretching the material part way, but often this is not required. These presses are made in several sizes. The largest standard size has two cylinders, 54 in. apart and has jaws 98 in. long. The cylinders are under separate control and are sometimes raised alternately to facilitate the stretching operation.

The friction screw press is also in wide use in Europe. This is used on fairly small parts on work that is usually done in this country on drop hammers. It gives the metal a little more time to flow and on the whole it seems to have a higher rate of production with better control of the final pressure.

Cutting

For cutting blanks the same methods are employed as here: blanking dies, circular shears, and unishears. The only tool not in general use in America is the Pels shear which is a unishear with an extremely small blade. With this machine a template can be used as on a nibbler and the results are excellent.

There are two tools in wide use in Europe of which I have seen very few in the United States, a wheeling machine and the "Stauchmachine." The first is simply a wide throat set of crowned rolls with the pressure regulated by foot control. Instead of rotating the roll by power or hand, the work is alternately pushed and pulled through, being shifted by zigzagging it to secure the stretching of the metal in the desired places. It supplants the power hammer and has the advantages of being noiseless and of not requiring as much skill to operate.

The Stauchmachine, or upsetting machine, was invented by the late Professor Junkers and, aside from the power hammer, represents the only machine that I know of capable of upsetting or shrinking sheet metal. Moreover, it will upset it to almost any desired degree without excessive work hardening. The machine has two broad types of uses: it is possible to bend angles and light extrusions (done on rolls in this country) and also it will flange on a curve and impart double curvature to a piece of flat metal; its other general use is on the assembly line where it is used to correct previously formed metal.

Small Tools

A French firm has developed a method of tightly clamping two pieces of metal together while they are being riveted by means of a contracting spring clip which passes through previously drilled rivet holes. This clip is applied from the outside with a specially designed pair of pliers. It eliminates the temporary bolting together of pieces.

Gang drilling using mechanical indexing is used on spars in England where it was developed originally for stainless strip steel fabrication.

Tracks for mounting riveters are just coming into use and seem to work efficiently.

Assembly methods and jigging are similar to what is used here. Most factories have large numbers of identical jigs where the fuselage or wing is completely assembled. Occasionally one finds progressive jigs where the spars and ribs of the wing are assembled on one jig and the wing then removed and placed on another where part of the covering is applied and then again placed on a third jig where the wing is completed. This approximates our automobile assembly lines.

* Abstract of a paper presented at the National Aircraft Production meeting of the Society of Automotive Engineers at Los Angeles, Cal., Oct. 7 to 9.

FRONT view of Ford's drill making plant at Newburg, Mich., which has its own water power and is a notable achievement in architectural design.

Drill Making at Ford's Village Unit

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By J. B. NEALEY
American Gas Association

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A balancing of industry with agriculture and not against it is Henry Ford's idea back of his "little industries" enterprise comprising 12 small automobile parts plants located in rural sections of Michigan. With the belief that industry and agriculture should go hand in hand, "decentralized industry" some call it, he has placed these units at water power sites along the Rouge, Huron, Raisin and Saline Rivers. Employees, living in the surrounding territory, are enabled, in their spare time, to operate small farms and garden plots.

Ford's most modern village unit has just been completed at Newburg on the Rouge River at a place where the little river has been dammed to form a pond for water power.

Nestling against the hill with the pond as a background is a completely lighted, air conditioned plant which is a notable achievement of architectural design. Of brick, concrete and steel, this 40 x 130 ft. plant is lighted from a solid facade, windows on both sides, running almost from floor to ceiling. These double glassed windows, which are never opened, are equipped with aluminum venetian blinds located on the outside. Cooled air is supplied in summer from two refrigerating units and warm humidified air in the winter from a steam boiler. Artificial lighting is from concealed lights in the ceiling. The floor is composed of wood blocks and the interior is painted white. The generator room is at a slightly lower level, has a plate glass front and end and houses a modern 25 KW generator driven by a water wheel of the propeller type.

Twist drills of the smaller sizes (⅛ to ¼ in. in 1/64 in. sizes) are made here for use in Ford's main plant and other units. A new type of machine has been developed for cutting these drills and special gas fired furnaces were designed for their heat treatment. The alloy steel used at the present time is the 18-4-1 steel (tungsten, chromium, vanadium).

The gas furnace designed for hardening is of the continuous, full muffle type, 4 ft. in all dimensions (outside) and sets on 4 ft. legs. The silicon-carbide muffle is open at the charging and discharge ends but these small openings are covered with chain curtains and gas flame curtains. In this way a neutral atmosphere, so essential in high speed steel heating, is maintained within the muffle. The drills are handled in small nickel steel blocks 14 in. long with holes in which the drills stand upright. These blocks are made to pass through the furnace in an alloy steel channel.

When the drills and blocks emerge from the furnace the former are renewed and dropped into an oil quench tank below the furnace while the blocks ride back to the charging end of the furnace in the conveyor which forms a closed loop.

Heat is supplied by four gas burners, two on each side, pressure air from a blower inspirating gas in the proper ratio for complete combustion. The correct heat is maintained with an automatic temperature control of the potentiometer type which actuates an on and off valve in the air supply line. The two atmospheric control burners are located, one at each end, inside the chain curtains and extend across the muffle openings with sheets of flame. Water gages show the gas and air pressures which are kept at ⅝ in. and ⅞ in. respectively but can be adjusted to meet varying conditions.

The drawing furnace is also of refractory construction and encased in steel but is of the vertical circular type. It is 31 in. in diameter and 33 in. high (outside) and contains an alloy pot 10 in. in diameter and 16 in. deep in which the drills are held while being drawn. On the side of this furnace is a combustion chamber, 12 in. by 15 in. by 22 in. high, and a single gas burner, of the high pressure venturi type, fires up into the bottom of this. The hot products of combustion enter the furnace heating chambers from the bottom and tangentially to the inside wall and after swirling around the pot are returned to the combustion chamber for reheating and recirculation. Any excess is bled off through an exhaust. This burner operates by pressure gas inspirating the air necessary for combustion. The air is furnished from a small motor-driven compressor. When charged the furnace and pot are closed by a heavy top door which is clamped tightly into position. The same type of temperature control as already described is used with this furnace but it actuates a valve in the gas line this time. An instrument board contains two indicating pyrometers, one for each furnace.

Prior to cutting the drills the steel is normalized by heating it slowly and uniformly to 1600 deg. F. After it is soaked at this temperature it is then covered with powdered mica, infusorial earth, or lime, the burners shut off and

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ECONOMICAL draw furnace containing an alloy pot to hold the drills. A single gas burner supplies all the heat required and part of the combustion products are reheated and recirculated. An automatic temperature control maintains the proper heat.

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A FULL muffle, gas fired drill hardening furnace which is continuous in operation and automatic as to temperature control. The muffle openings to accommodate the flow of work are covered by chain curtains and gas flame curtains. The drills, upright in blocks, pass through the furnace in an alloy steel channel in the form of a closed loop.

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NEW type of vertical drill making machine developed by Ford engineers which cuts both flutes at the same time with two, opposed revolving flute cutters. The stock is fed down between the cutters from above, the proper twist being given by a cam control.

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allowed to cool slowly in the furnace. The covering is to maintain the softness, as it hardens if allowed to cool in the air. This treatment is given at the mill. After being cut, the drills are hardened from the first furnace described here by heating them to 2350-2375 deg. F. With these thin section drills only about 1¼ min. time is required in the furnace when they are quenched in oil although this time varies with the size of drill.

Heavier tools of this type of steel are usually preheated to 1550 deg. F. and then transferred to a furnace which is carried at 2250 to 2400 deg. F. and allowing them to remain until "sweat" appears on the surface. In order to obtain the most satisfactory "red hardness" condition the steel should be brought rapidly to the higher temperature. In many cases, however, the character of the cutting edges of certain form tools, such as milling cutters, threading tools, etc., makes it inadvisable to use the higher temperatures because the delicate cutting edges may be destroyed through blistering, pitting, etc. Therefore the high temperatures are used only with tools such as rough lathe tools while the finer class tools are hardened at the lower temperature. Excessive grain growth with subsequent brittleness is encountered if these high speed tool steels are heated longer than necessary at the higher temperatures. Tools that cannot be ground after hardening are often heated in a barium chloride or some other suitable bath. In quenching in oil or air it is often advisable to hold the quench at 150 to 200 deg. F. to eliminate any possibility of breakage with intricately shaped tools.

Returning from this digression to the case in hand the hardened drills are drawn for secondary hardness in the second furnace described by heating them to 1050 deg. F. for two hours. This gives them a Rockwell hardness of 80-82 on the 30 N scale on Rockwell superficial hardness tester. This is equal to 63-65 on the regular C scale.

These drills are made in the following operation:

(1) Cut off and point.
(2) Fluted.
(3) Hardened and drawn.
(4) Centerless ground.
(5) Clearance ground.
(6) Points ground.

The new machine for drill making is vertical and cuts both flutes at the same time. This is accomplished by two opposed revolving flute cutters, and the drill stock is fed down between them from above, the proper twist being given through a cam control. The time required to cut the flutes is only 90 seconds regardless of the size of the drill. This machine was developed and built by Ford engineers.

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BATTERY of newly designed drill making machines, with operators. Working and living conditions are ideal for the operators.

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A NEW 12-speed transmission of the sliding gear type, roller bearing equipped spindle, automatic spindle brake and independent power rapid traverses and feeds for each carriage are features.

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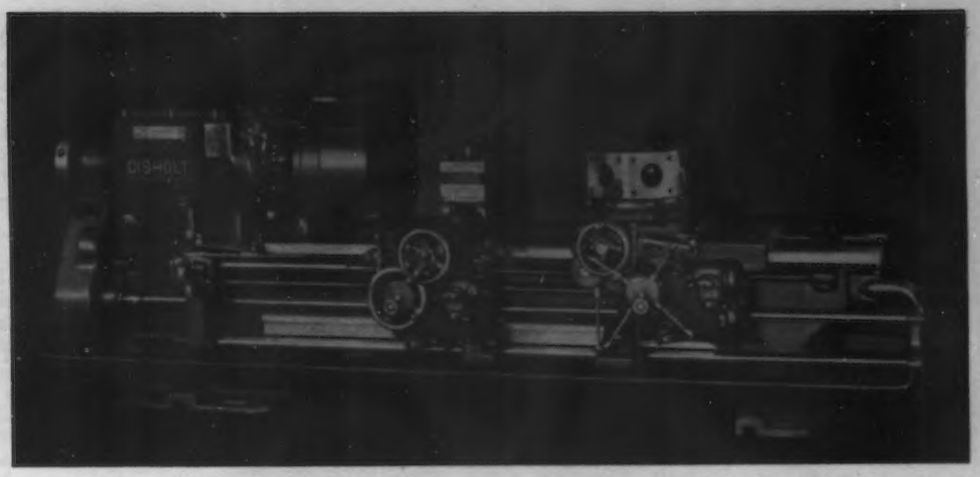


Improved Heavy-Duty Turret Lathes

MANY new features to increase production, make operation easier and faster, and improve the quality of the work have been added by the Gisholt Machine Co., Madison, Wis., to its line of 3AL, 4L and 5L heavy-duty turret lathes. The three machines are identical in design, differing only in capacity, which ranges from 6 to 12 in. bar size and from 21 to 32 in. chucking diameter. They are intended for both large quantity production of similar pieces or small lot jobbing of irregular and varied types of work. The machines are available with complete attachments, standard tools, chucks, boring bars, reamers and special tools and holding devices.

In the construction, the bed and headstock of these machines are cast in one piece from nickel semi-steel. The strength and rigidity start with this bed casting which weighs nearly half the total weight of the finished machine. The bed ways are of steel, hardened and ground in place, which provide a bearing that minimizes wear and preserves accuracy.

The new 12-speed transmission is of the sliding gear construction and has a normal speed range of 12 to 220 r.p.m. for the 3AL and 8 to 142 r.p.m. on the 4L and 5L. Speeds are arranged in geometric progression. The spindle is mounted on twin tapered roller bearings at the front and a straight roller bearing at the rear. An automatic multiple-disc spindle brake stops the spindle quickly when the clutch lever is placed in neutral position. This feature is a time saver when stopping to remove the piece from the chuck as well as holding the chuck stable while chucking. All gear shafts and bearings run in an oil bath and the spindle bearings are continually fed with clean oil from a catch reservoir.

Feeds and rapid traverse are controlled at each carriage independently of each other. The eight reversible feeds are selected at the aprons and range in arithmetical progression from 0.008 to 0.250 in. With the change gears provided, this range may be varied from a fine range of 0.004 to 0.125 in. to a coarse range of 0.016 to 0.500 in. providing a total of 64 available feeds. Feeding is accomplished through separate lead screws for each carriage and the feeds provided permit the cutting of all U.S. standard threads from 2 to 32 including 11½. Special change gears may be provided for special threads.

Power rapid traverse for the longitudinal movement is independent for each carriage and may be used without disengaging the feed. An electrically operated power rapid traverse may be supplied for the cross slide or the compound slide which, on some types of work, materially increases production.

Multiple V-belt motor drive is standard with the motor mounted on the headstock.

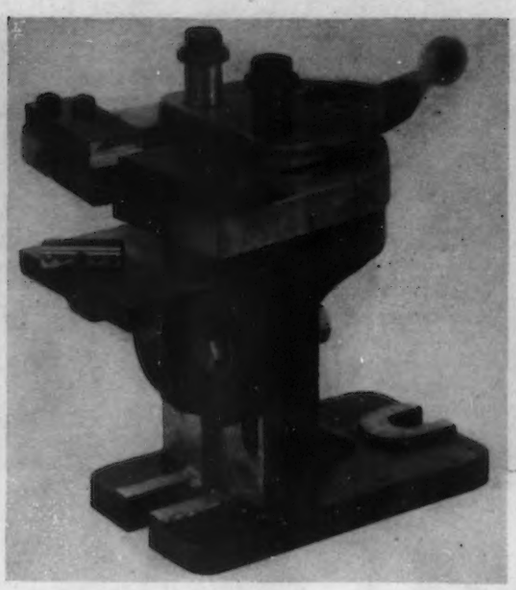
The broad turret mounting affords rigid support to the hexagon turret which is clamped by closing a double bevel clamp ring actuated by a powerful eccentric toggle. Each face of the turret is located by a tapered pin which seats in tapered index bushings. All parts of the locking and locating mechanism, subject to wear, are made of hardened steel to insure accuracy throughout the life of the machine.

Machines are available with either fixed center hexagon turrets or cross feeding turrets. The cross feeding turret permits of facing as well as turning and boring cuts with the hexagon turret.

Thorough lubrication is insured to all important bearings by effective automatic methods. The headstock runs in an oil bath as do the gears in each apron. The rapid traverse clutches and gears also run in a continuous oil bath. The hardened steel ways are lubricated by means of force feed pumps attached to each carriage. Each movement of the rapid traverse lever delivers oil under pressure to each way under the carriages.

Extra attachments are available for adapting these machines to individual manufacturers' requirements. These include a compound slide carrying the square turret; bar feed, either power or hand operated; collet chucks for 3ALs; turret centers for heavy work where outer support is required; selective gear box in place of pick-off gears for varying the speed of the feed shaft; taper attachments for both the cross slide carriage or the hexagon turret carriage, Gisholt 3-jaw scroll chucks; 4-jaw independent chucks; 4-jaw combination chucks and hydraulic chucks; and an extensive line of standard tool equipment for chucking work and bar work.

Quick-Acting Machine Vises



KNUCKLE-ACTION vises of the construction here illustrated are being offered by the Knu-Vise Products Co., 6434 Cass Avenue, Detroit, for use in connection with drilling, reaming, tapping, countersinking, milling, assembly, and other operations. Bushing plates and angle brackets can be supplied for making of drills, jigs, tapping fixtures, etc.

These vises are designed to permit rapid insertion and withdrawal of the work pieces and quick application of pressure with minimum effort. Movement of the clamping handle is through 30 deg. only, while the maximum movement of the clamping jaws is about ¾ in., regarded as sufficient for most jobs. The work is always in plain view of the operator, and ample chip room is provided.

Models available include the Nos. 325, 330, and 333, the latter illustrated. The No. 325 model was designed primarily for long-run jobs, the angle bracket being permanently dowelled and screwed in place to suit the particular job.

The model 330 has only one movable jaw that clamps the work firmly against a keywayed heelplate, and may be moved up and down, or swung at any angle. The versatility and rigidity of this particular model suits it for use on milling machines in screw machine products plants, etc.

The unit illustrated, the model No. 333, is of general utility. The angle bracket moves up and down, may be swung to any angle, or used merely as a chute to direct the finished product. Both jaws moving uniformly tend to keep the work always in the same relative position, even allowing for dimensional variation of stock. One set of jaw inserts are furnished as a blank, to enable the user to fit to his own particular application.

All models are 5¼ in. wide, 10½ in. long overall, and 7½ in. high.

Permanent Magnet Type Chuck

A MAGNETIC chuck of the permanent magnet type has recently been introduced by the Brown & Sharpe Mfg. Co., Providence. Unlike electromagnetic types, these chucks have no electrical connections, and long life and full holding power are claimed for them, with the absence of any heating effects under any conditions. The chucks are completely enclosed and may be used for either wet or dry grinding, since coolant can not enter the internal parts. They are also adaptable for holding work for light cuts on shapers or for bench work, in holding small, thin pieces or large pieces for polishing and the like. In fact, the lack of electrical connections extends the usefulness of these chucks for a wide variety of purposes.

By the simple movement of a hand crank, the magnetic flux is controlled, simply by changing the position of the permanent magnets in relation to the top plate so that the lines of force pass through the work or are short-circuited through the top plate. The crank has "on" and "off" positions, 180 deg. apart. Magnets are of a special alloy especially selected to maintain the magnetic energy.

Work surface and base are ground parallel and at right angles to the back. Both the ends and back are provided with removable stop plates which may be adjusted vertically. Moving parts are equipped with greaseless bearings. The design is patented and is offered for sale only in the United States.

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BY movement of the hand crank, the position of the permanent magnets in this chuck can be changed so as to release the work.

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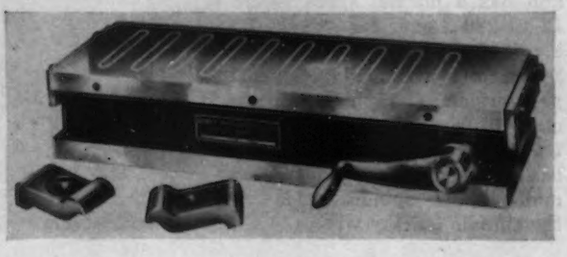


Heavy Duty Diesel For Small Power User

FOR small power users of a heavy-duty, continuous service stationary engine, Fairbanks, Morse & Co., 900 S. Wabash Avenue, Chicago, has developed the Model 42-E diesel engine. It is available in two- and three-cylinder combinations with ratings of 60 and 90 hp. at 450 r.p.m., and can be furnished for direct-connected, belt or electric generator drive.

With an 8¾-in. bore and 10½-in. stroke, this diesel is smaller and lighter than the F-M Model 32-E, but it embodies all of the proven features of that design. It is small enough to be installed where space and head room are limited, and it is applicable for any power requirement within its horsepower ratings. The engines are conservatively rated and will operate continuously at rated capacity without overheating.

Two important principles of design — direct airless injection of fuel and two-cycle design with crankcase scavenging—result in use of a minimum of moving parts. The power impulse on each downward stroke assures a uniform output without need for an abnormally large flywheel. Cylinder heads are simplified by the elimination of air inlet and exhaust valves. All working parts are enclosed, but are accessible for inspection and maintenance.

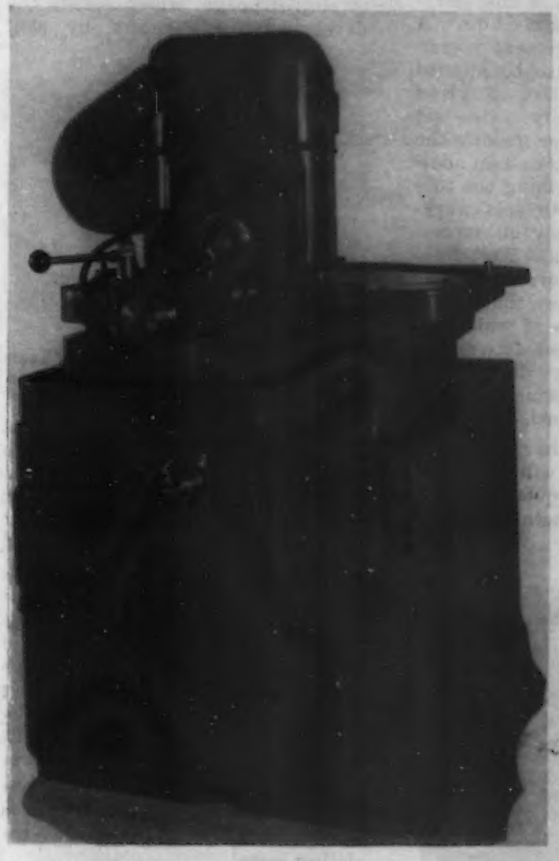
Machine for Finishing Gears By Enveloping Generating Process

A NEW machine for finishing gear teeth by the enveloping generating process has been placed on the market by the Fellows Gear Shaper Co., Springfield, Vt.

The principle employed in removing metal differs from conventional gear cutting methods in the following particulars: (1) the tool and work are rotated together without control by any indexing mechanism; (2) cutting is accomplished by setting axes of tool and work askew to each other and by bringing the tool into intimate contact with the work under pressure; and (3) the tool is rotated at high speed and traversed at slow speed, first in one direction to finish one side of the teeth, then reversed, and rotated and traversed in the opposite direction to finish the other side of the teeth.

When tool reciprocation is not restricted, the tool is traversed for a distance slightly greater than the gear face width, and one complete cycle finishes the gear. In cases where full face width reciprocation is restricted by a shoulder, the work is fed steadily upward into the tool, the latter being reciprocated about 1/32 in. to enhance the cutting action and improve the finish. This upward feeding action continues for a predetermined time, the tool making one or more cycles, depending upon amount of material to be removed.

Tools used on this machine, the No. 8, are made in a variety of types depending upon the character and shape of the work and other conditions. The two-piece type of tool, shown in Fig. 2, can be used

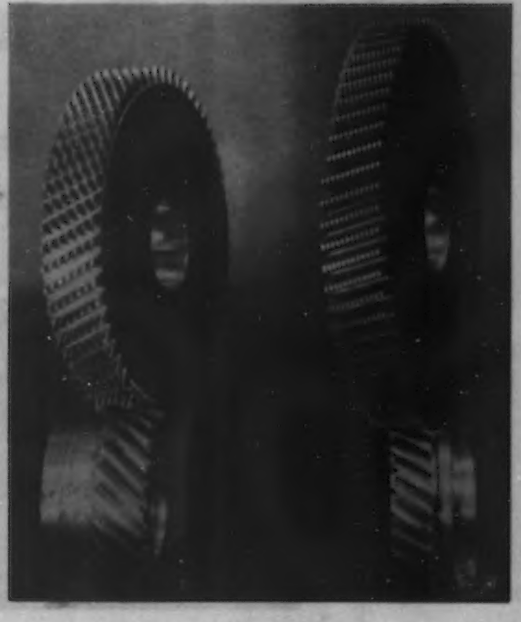


ABOVE

FIG. 1—Fellows No. 8 enveloping gear generator for finishing spur and helical external and internal gears.

UPPER RIGHT

FIG. 2—Two-piece tools used for finishing spur and helical gears.



LOWER RIGHT

FIG. 3—One-piece enveloping generating tools of slotted and serrated tooth types.

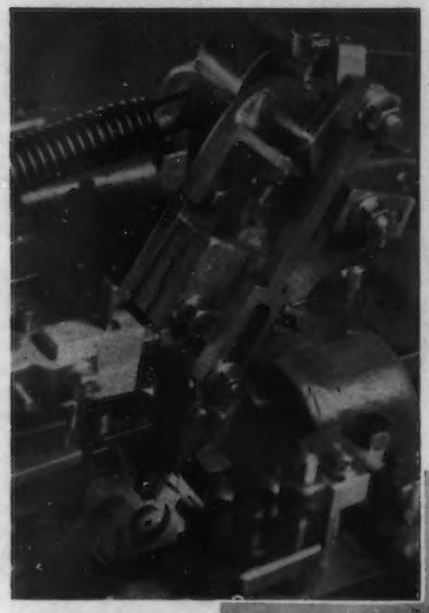
for finishing spur and helical gears when there is no interfering projection on the work. The one-piece "slotted" type tool shown at the left in Fig. 3 is made with deep angular slots cut to the full depth of the teeth and on a helix, thus producing a multiple number of cutting edges. It is very free cutting and is especially adapted to the cutting of shoulder gears. Because of its design, it is eminently suited for semi-finishing where the character of the work requires two finishing cuts. When used for final finishing, the tool is ground to envelop the work. The tool at the right in Fig. 3 is of the "serrated" tooth type with a series of shallow grooves cut on both sides of the teeth to present a multiplicity of cutting edges to the work. This tool is particularly suited to final finishing.

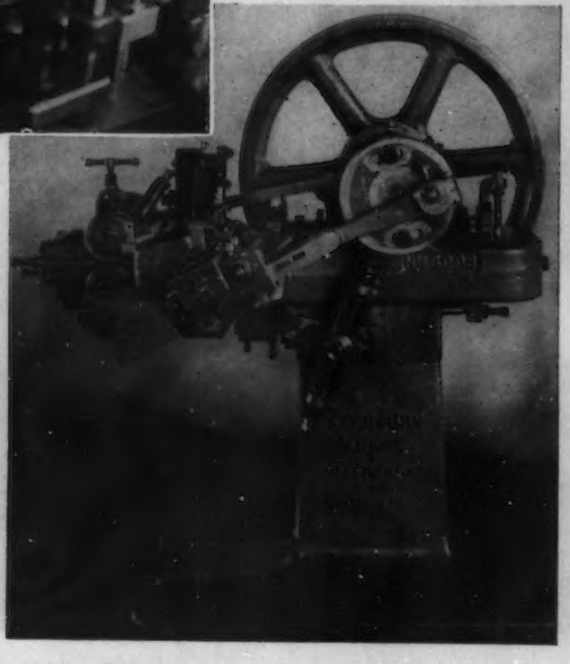
The machine is automatically lubricated and is arranged for complete electrical control. Maximum capacity is 8 in. pitch diameter, 2½-in. face width, and 4 diametral pitch.

Tubular Rivet Headers

THE ⅛ and 3/16 in. standard solid die double stroke toggle headers made by the Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., are now available equipped for making tubular rivets having a depth of hole limited to about one diameter. A patented tool arrangement is employed, which can also be applied to existing headers of this style and capacity. One set of tools is used for making the head in two blows and an additional set for forming the tubular portion, both sets working simultaneously on successive rivet blanks. The close-up illustration herewith shows the dies and also the spring fingers by means of which the rivets are carried from the regular heading die to the auxiliary die in which the tubular end is formed.

It is claimed that the use of these machines will eliminate the usual subsequent drilling operation and metal loss, and consequently offer an economical means of manufacture. Production is at the rate of 100 per min. For hollow rivets larger than 3/16 in. in diameter, the company recommends its standard automatic rivet drilling machine.





ABOVE

DIES and transfer mechanism that carries the rivets from one die to the other.

AT RIGHT

THIS 3/16-in. tubular rivet header, for rivets up to ¾-in. long, makes head and hollow end simultaneously.

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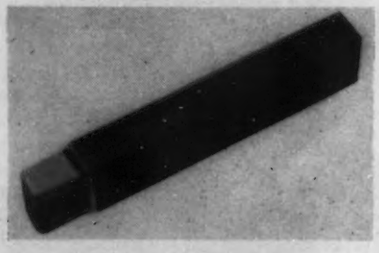
Tantaloy—a New Tool Alloy

A NEW hard-cutting tool and wear-resisting alloy known as "Tantaloy" has been developed by Fansteel Metallurgical Corp., North Chicago, Ill. It is a general-purpose hard metal ordinarily used as a tip which is brazed to a steel shank to form a cutting tool.

The alloy contains tantalum carbide and possesses a high degree of chip slippage, which resists the development of craters by chip action. When regrinding, Tantaloy tools require little metal removal, thus decreasing the grinding time and increasing the useful life of the tool. Its toughness is said to make Tantaloy-tipped tools highly efficient for severe service, such as in interrupted cuts, heavy feeds, or varying hardness of metal.



Tantaloy-tipped tools are available in all standard lathe, boring mill and turret tool sizes and the metal is also available in tips which may be brazed to boring bars, counterbores, or special tools. The material is offered also for gages, lathe centers, centerless grinder rests, wearing surfaces, and the general field of application of abrasion and corrosion resisting metal.

Magnetic parallels in ¾ x 1½ x 3-in. and 1 x 2 x 4-in. sizes have been added to the line of set-up tools marketed by the Taft-Peirce Mfg. Co., Woonsocket, R. I. They are made with alternate laminations of brass and steel, but are magnetically universal in that they may be used on all models of the company's superpower magnetic chucks and on any type of magnetic faceplate.

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	September 1937	August 1937	September 1936	Nine Months 1936	Nine Months 1937
Raw Materials:					
Lake ore consumption (gross tons)[a]	5,157,411	5,373,264	4,026,690	31,434,081	45,141,121
Coke production (net tons)[b]	4,679,875	4,829,862	3,990,700	33,095,400	41,736,671
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	3,410,371	3,605,818	2,711,721	21,564,508	30,221,640
Pig iron output—daily (gross tons)[c]	113,679	116,317	91,010	78,703	110,702
Castings:					
Malleable castings—production (net tons)[d]	52,728	49,022	46,552	407,310	499,084
Malleable castings—orders (net tons)[d]	41,652	49,376	44,361	395,626	467,239
Steel castings—production (net tons)[d]	.....	92,089	76,617	587,427	.....
Steel castings—orders (net tons)[d]	.....	54,753	56,877	613,827	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	3,401,869	*4,875,671	4,151,388	33,526,142	42,498,769
Steel ingot production—weekly average (gross tons)[e]	1,005,110	*1,100,603	969,950	856,570	1,089,712
Steel ingot production—per cent of capacity[e]	76.52	*85.79	74.05	65.40	83.12
Finished Steel:					
Trackwork shipments (net tons)[e]	8,101	7,530	5,722	52,931	77,891
Fabricated shape orders (net tons)[g]	117,859	117,612	118,158	1,189,878	1,315,240
Fabricated shape shipments (net tons)[g]	154,295	158,228	145,521	1,135,598	1,237,139
Fabricated plate orders (net tons)[d]	31,484	*31,783	35,033	358,763	341,972
U. S. Steel Corp. shipments (tons)[h]	1,047,962	1,107,858	961,803	7,867,707	10,956,846
Ohio River steel shipments (net tons)[i]	122,600	133,650	95,705	785,381	1,007,645
Fabricated Products:					
Automobile production, U. S. and Canada[k]	175,620	405,064	139,820	3,461,468	3,910,418
Construction contracts, 37 Eastern States[l]	$207,071,800	$285,104,100	$234,271,500	$2,041,628,000	$2,307,014,300
Steel barrel shipments (number)[d]	725,699	771,427	795,746	6,047,000	7,538,467
Steel furniture shipments (dollars)[d]	2,083,919	$2,022,913	$1,549,808	$13,710,553	19,888,435
Steel boiler orders (sq. ft.)[d]	661,372	917,927	892,027	7,733,136	8,001,924
Locomotive orders (number)[m]	[q]	39	24	158	278
Freight car orders (number)[m]	1,195	1,490	3,100	37,348	47,805
Machine tool index[n]	210.7	179.8	118.5	†132.0	†187.2
Foundry equipment index[o]	231.8	257.5	161.0	†155.3	†231.2
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	.....	61,489	59,993	487,775	.....
Imports of pig iron (gross tons)[p]	.....	7,952	15,080	137,607	.....
Imports of all rolled steel (gross tons)[p]	.....	26,982	28,618	200,240	.....
Total iron and steel exports (gross tons)[p]	.....	886,319	235,577	2,459,247	.....
Exports of all rolled steel (gross tons)[p]	.....	286,774	74,489	790,422	.....
Exports of finished steel (gross tons)[p]	.....	202,949	66,068	716,598	.....
Exports of scrap (gross tons)[p]	.....	473,933	152,290	1,589,980	.....
British Production:					
British pig iron production (gross tons)[r]	.....	712,600	650,800	5,696,800	.....
British steel ingot production (gross tons)[r]	.....	987,700	1,027,000	8,618,000	.....
Non-Ferrous Metals:					
Lead production (net tons)[s]	41,046	46,965	32,982	330,115	387,641
Lead shipments (net tons)[s]	53,850	54,551	50,685	351,806	468,768
Zinc production (net tons)[t]	50,027	48,309	42,210	384,331	436,107
Zinc shipments (net tons)[t]	47,737	50,643	51,775	391,607	467,545
Deliveries of tin (gross tons)[v]	8,245	7,580	6,200	55,725	65,240
Copper production, refined (net tons)[w]	90,982	*82,835	75,892	748,660	740,893

†Three months' average. * Revised.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census. [l] F. W. Dodge Corp.; [m] *Railway Age*; [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange; [w] Copper Institute.

THIS WEEK ON THE ASSEMBLY LINE

. . . Auto production levels off above 90,000 mark while Ford output is held up.

o o o

. . . 4⅓ billion dollar year completed by auto manufacturers with car total set at 5,110,000.

o o o

. . . Ford Kansas City plant will reopen with assurance of protection by civil forces.

o o o

. . . Industrial center on St. Clair River planned by Eastern interests.

DETROIT, Nov. 1.—Privately, many automotive men are facing the fact that possibilities for continued high production are not as promising as at first predicted. A slight but significant decline in automobile output was registered last week. The industry will feel its way slowly with assembly lines maintaining present speeds until either decided acceptance or disinterest is manifested in the new cars. Unless the Ford Motor Co. succeeds in attaining some volume this week, there will be little advance. There is a pessimistic note in the apparently well-founded assertion that the industry is even now putting itself on a four-day week operating basis and that one manufacturer is laying off 1000 employees and reducing schedules. Indications are that the four-day week and lay-offs have not yet affected assembly line workers but have hit the production divisions sharply. Delays in shipments of steel and other materials have been ordered in numerous cases in the last week, with no explanations offered.

In the last week, according to Ward's Automotive Reports, output was 90,155 units, an unexpected decline from the 91,905 of the previous week. However, this is still more than 19,000 cars better than the corresponding week for a year ago, when 71,095 cars were produced. Perhaps after all the outlook in the present situation is colored a great deal by reflection of the boom year just ended. The 1937 model year saw ownership of motor vehicles in the United States and in the entire world advance to new records. The Automobile Manufacturers Association estimates motor vehicle registrations in the United States at 29,000,000, of which 24,600,000 are passenger cars and the rest commercial vehicles.

Factory sales of cars and trucks in the United States easily cleared the 5,000,000 mark in the 1937 model year with 110,000 to spare. This was 12 per cent greater than the 1936 model year factory sales and represents a wholesale volume of $2,876,500,000. This was accomplished by a gigantic turn-over in parts and accessories for replacement and service equipment where the wholesale volume was $1,075,000,000. Another $353,000,000 was spent for tires to replace worn-out rubber. Putting it all together, the total for motor vehicles, accessories, service equipment, replacements of parts and tires is $4,304,500,000. The domestic use of motor vehicles as measured by gasoline consumption set a new record during the 12-month period ended September, 1937, with 19,300,000 gal. of gasoline being consumed.

Other units of national business should be interested in the relation of the automobile industry to their respective fields. It is generally known that the automotive industry is the largest purchaser of gasoline, rubber, steel, malleable iron, mohair, lubricating oils, plate glass, nickel and lead. The percentages of total consumption given by the A.M.A. are:

Gasoline, 89 per cent; rubber, 75 per cent; steel, 18 per cent; hardwood lumber, 6 per cent; copper, 17 per cent; lead, 36 per cent; zinc, 11 per cent; tin, 14 per cent; aluminum, 12 per cent; nickel, 23 per cent; lubricants, 40 per cent.

Gleaned from all the comments on Ford's failure to get into high production are two outstanding facts.

The factory, it has been learned, has been trying all these weeks to iron out production difficulties in the fender stamping department. This trouble also besets the Lincoln Zephyr division but was cleared up in reasonably short order. At the Rouge plant it was stated late last

week that a definite date for the return to normal production speed has not been set. The bulk of assembly workers, now idle, have received no notification as to when they will return to work.

In the second place, Ford probably is not over-anxious to produce cars now because there is apparently a large stock of 1937 models still in the hands of dealers. Naturally these must be moved before new models can take their place on the sales floor.

Word was given out the end of last week that Henry Ford will authorize the reopening of his Kansas City plant, closed recently when the factory manager complained of inadequate police protection during a strike. The announcement came not from the Ford company, but from H. F. McElroy, city manager of Kansas City, at the conclusion of a 4-hr. conference Friday with Mr. Ford and Harry H. Bennett, Ford personnel director. When McElroy and Bennett emerged from the Ford engineering laboratory building in Dearborn after the meeting both were smiling. The Ford representatives remained in the background, while McElroy said to newspaper men:

"You can say that after conferring with Mr. Ford and Mr. Bennett, I am going back to Kansas City to make possible the reopening of the Ford plant."

A telegram was sent to the Kansas City mayor which said in part, "I found Mr. Ford anxious not to infringe on anyone's rights." The procedure agreed upon, Bennett said, is that McElroy, upon his return to Missouri, will send a letter to Edsel Ford, president of the company, offering police protection. On receipt of the letter, the plant will be reopened. About three or four weeks will elapse, Bennett said.

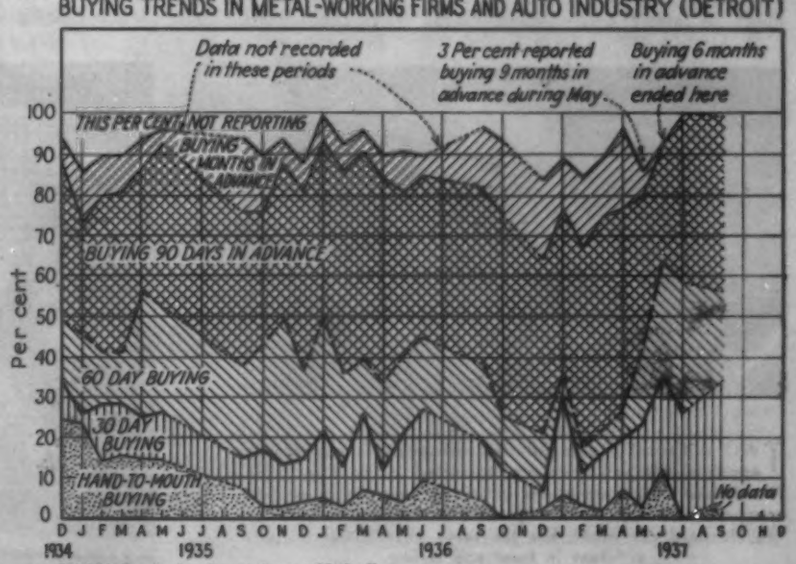
New Plant Projected

What appears to be preliminary negotiations for establishment of a large industrial enterprise on the St. Clair River, between St. Clair and Marine City, are indicated in two realty transactions in that section. It has been learned that recently eastern interests acquired 374 acres with 4442 ft. of river frontage south of St. Clair. This was followed almost immediately by the purchase of an adjacent 400 acres. Rayon manufacture and an office furniture factory both have been mentioned. Approximately $400,000 was involved in the two property deals.

Still other industrial expansion programs which have come to light recently are along the northern border of the city of Detroit and Wayne County, although a few of the proposals have been rejected temporarily because of uncertainties and fear of the immediate future. In addition to Dodge truck and Briggs plants which will be erected on Mound Road, the Carboloy Co., Inc., Detroit, a subsidiary of General Electric, announced very recently that they contemplate the erection of a $750,000 plant a few miles east. Carboloy has purchased 40 acres along the Grand Trunk Railroad tracks north of Eight Mile Road.

The Divco Twin Truck Co., which has been in the Continental plant on East Jefferson Avenue, has pur-

BUYING TRENDS IN METAL-WORKING FIRMS AND AUTO INDUSTRY (DETROIT)

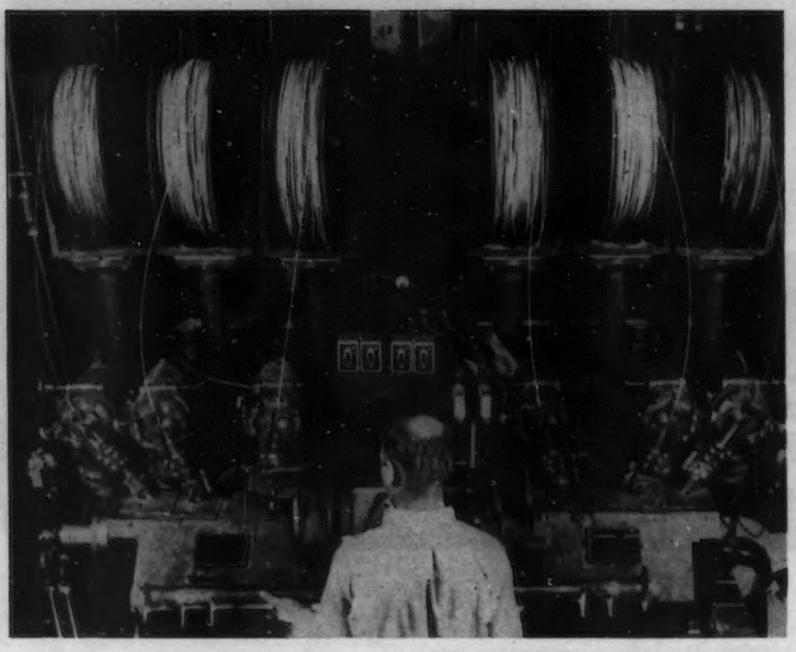


SOURCE: Purchasing Agents Assoc. of Detroit

chased 12 acres near the Carboloy site. Fruehauf Trailer Co. and Electromaster, Inc., a stove manufacturer, have eyed sites in this vicinity, but it is definitely established now that they will not go ahead with any program for a while. Firestone Steel Products Co., which has just erected a down-river plant to manufacture automobile rims and other specialties, has decided not to put up a second section to its new plant, although architect's plans were completed months ago.

Detroit had a keen interest in a commemorative luncheon given last week in New York by General Motors in honor of Rudolph Diesel. Aside from its general interest in anything that affects power for transportation, Detroit now has on Plymouth Road and Outer Drive a large Diesel engine factory directed by General Motors. If the industry develops as it promises, motors will be built in this plant not only for automotive purposes, but also for refrigeration, light, power, marine and other needs, according to Charles H. Kettering, research director of the comporation, who spoke at the luncheon.

The strong probability that 1939 will see some radical changes in automobiles means a busy season ahead for engineering departments. This throws further interest on two training programs that have come to light, both of them new and both of them attributable in large part to the prospects of a shortage of well-trained draftsmen for the body divisions of the automobile engineering departments. Body drafting is a highly specialized form of the art, and results are largely dependent upon long experience. Ordinarily, college graduates are not anxious to stay "on the board" long enough to develop a great deal of skill for such work. The development of many other sheet metal products has tended to draw men from their jobs in automobile drafting rooms to draw up streamlined refrigerators or some similar product.

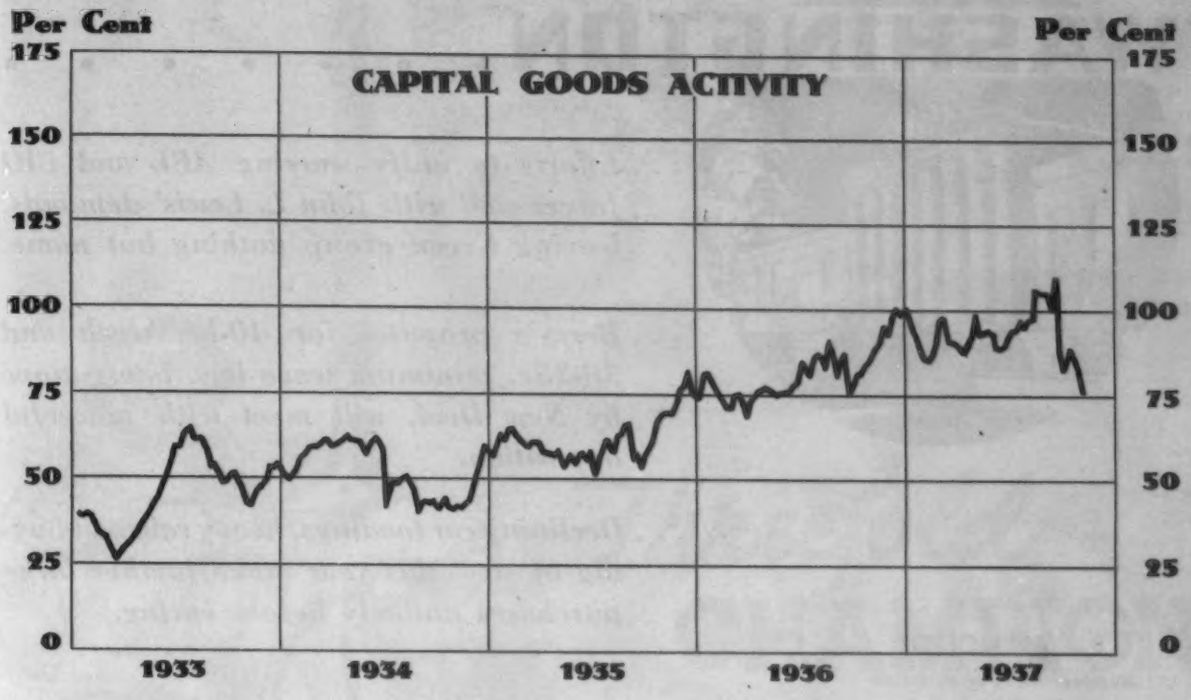


IN this new automatic welder six electric welding heads operate at the same time attaching two flange plates and two spring seat brackets on a rear axle housing. A rotating fixture in front of the operator holds the housing while six welds are made simultaneously. This machine was designed by the master mechanics and plant engineering dept. for use in the Chevrolet Gear & Axle plant in Detroit on 1938 models.

At Chevrolet a definite apprentice program has been instituted. About a score of young men have been put to work, first in the record department for about three months, then getting out blue prints and drawings and doing similar general work in the drafting room for about three months, during which time private coaching and night work is given to them to prepare them to start on the drawing board. This is followed by 18 months' work in the drafting room on a carefully laid out schedule that gives them a wide variety of experience. At the end of the two years, they are not skilled draftsmen, of course, but they do provide a supply of well-trained draftsmen and from this number will undoubtedly come the skillful sketchers of streamlined styles of the future.

Nine big architectural contracts totaling $3,000,000 have been awarded in Michigan by the State Administrative Board in an institutional building program. The projects consist of hospitals at Kalamazoo, Traverse City, Pontiac, Ypsilanti, Ionia, and other institutions at Coldwater, Lapeer, Wahjamega and Mt. Pleasant.

TWO distinct V-8 cars differing noticeably in appearance, appointments and price are presented by Ford for 1938. The de luxe car, shown at the left, is entirely new in appearance; radiator is of new design and the fenders are massive. The standard car, right, has the same chassis, but is quite different in front end styling.



The Iron Age Weekly Index of Capital Goods Activity

(1025-27 = 100)

Last week	75.8	Same week 1934	41.0
Preceding week	82.5	Same week 1933	42.3
Same week last month	84.7	Same week 1932	34.1
Same week 1936	84.2	Same week 1931	49.1
Same week 1935	68.6	Same week 1930	75.4
Same week 1929	115.3		

WITH the exception of heavy engineering awards, all the components of THE IRON AGE index declined, bringing the adjusted composite figure to 75.8 for the week ended Oct. 30. In the order of weighted importance the automobile series showed the largest loss, dropping to 94.6 from 108.2 in the previous week, as assemblies declined 1750 units in a contraseasonal movement. In a comparable week last year assemblies totaled 71,095 units. A $10,000,000 award for a power house in New Jersey, and a $4,500,000 contract for work on the main span of the Bronx-Whitestone bridge accounted for the unexpected rise of 2.8 points in the adjusted index number of heavy engineering awards. Industrial activity and shipping operations in the Pittsburgh territory took another sharp drop and now stand at 78.0, 6.6 points below last week's position.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	51.0	—4.5
Automobile production (number of cars and trucks)	90,155	—1,750
Railroad loadings of forest products (number of cars)	32,883	—4,344
Pittsburgh industrial production and shipments (index number)	78.0	—6.6
Construction contracts awarded (total value)	$62,866,000	+$18,920,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE: (2) Automobile Production, from Ward's Automotive Reports: (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads: (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh: (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

WASHINGTON. . . . . .

. . . Efforts to unify warring AFL and CIO forces stall with John L. Lewis' demands, leaving Green group nothing but name.

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. . . Berry's proposal for 40-hr. week and 30-35c. minimum wage law, latest move by New Deal, will meet with powerful opposition.

° ° °

. . . Declining car loadings, heavy railroad buying of steel this year make further large purchases unlikely before spring.

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By L. W. MOFFETT
Resident Washington Editor
The Iron Age

° ° °

WASHINGTON, Nov. 2. — Stalled on the rock of industrial unionism, the three-day AFL-CIO "peace" parley here reached an impasse and recessed until Thursday of the present week with gloomy prospects that the deadlock can be broken.

As the situation now stands AFL remains adamant in its rejection of the bold CIO demand that employees in mass industries, including steel and automobile, be organized on an exclusive industrial basis. At the same time John L. Lewis' CIO remains equally adamant in rejecting the AFL demand that CIO dissolve and its unions come to the AFL fold on both a craft and industrial basis.

Meanwhile, the Administration is known to be making quiet but desperate efforts to have the two rival labor organizations negotiate a peace pact and to set up a united labor front.

Demands Startled AFL

The breadth of the CIO demands presented through its 10-man committee, headed by Philip Murray of the SWOC, startled the three-man AFL committee, headed by George M. Harrison, which, after regaining its breath, submitted counter proposals. Each committee flatly turned down the proposals of the other, and upon the suggestion of Harrison the negotiations were recessed with a dim hope that a cooling-off period might be had in which to brighten chances for peace.

The aggressive demands of CIO are so broad that if granted would leave AFL only a name and CIO become the dominant and almost the exclusive labor organization of the country.

What CIO Asks

First, the CIO demanded that employees in mass production, marine, public utility service and basic fabricating industries be organized exclusively on an industrial basis.

Secondly, CIO demanded that there be set up within the AFL a labor department to be known as the CIO, the latter to continue control of its present national, international and local industrial unions. The unions would be brought under the CIO department. The department would operate under its own departmental constitution and would be directed by its own officers with complete and sole jurisdiction in regard to the organization of workers in the industries in which it insists upon industrial organization. The department also would have jurisdiction over any matters affecting its affiliated organizations and its members.

Thirdly, the CIO proposed a national convention at such a time and place as may be agreed upon between the AFL and the CIO. The convention would include industrial unions affiliated with both organizations and would be called for the purpose of approving the foregoing agreement for working out necessary rules and regulations to effectuate the agreement and to guarantee the fulfillment of the program.

What AFL Seeks

Set against these ambitious demands were AFL proposals, which, with good reason, Murray said, would, if accepted, mean "abject surrender" by CIO. Briefly AFL proposed:

That the nine rebel CIO unions, including the Amalgamated Association of Iron, Steel and Tin Workers, originally chartered by AFL reunite with AFL with all rights and privileges enjoyed by them before affiliating with CIO.

That 23 other new national unions chartered by CIO be "disposed of" in conference to be held immediately for the purpose of bringing about an adjustment with AFL.

That final adjudication of differences be referred to the next convention of AFL with an aggressive organizing campaign in meantime among the organized and the unorganized workers along both industrial and craft lines "as conditions and circumstances may warrant."

The establishment "of one united,

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solidified labor movement," the CIO to "be immediately dissolved."

The Murray CIO committee, quickly declaring the AFL proposals as unacceptable, said that if the nine CIO unions were to return to the federation they would "desert and betray" the 23 new CIO unions and force them to relinquish their membership in any kind of a labor union. Branding the AFL proposal as "merely a reaffirmation of its former policy," the CIO committee said it "certainly does not contemplate the organization of the unorganized into strong unions."

Moreover, the CIO statement said, that the AFL proposal "as we understand it, constitutes a rejection of the principle of industrial organization in mass-production and other basic industries."

The CIO committee statement was amplified at great length by Murray at a press interview and through a formal statement in which he detailed the purpose of CIO "to organize the million of unorganized workers." He insisted that workers in mass and basic industries "would embrace the opportunity only if offered industrial unions."

Cites Amalgamated

Speaking of the position of the Amalgamated Association of Iron, Steel and Tin Workers under AFL jurisdiction, Murray said:

"The AFL, for example, has always contested the right of those who wanted to organize steel on an industrial basis. Although the Amalgamated Association of Iron, Steel and Tin Workers has had a charter for over 50 years as an industrial union the AFL said two years ago when the CIO was created that this old union could not be an industrial organization and that the crafts in it would have to be split up among the craft unions."

The AFL in its firm rejection of the CIO proposal said it provides no basis of settlement and that "it would make of the CIO a department of the AFL free and independent of the AFL itself in all matters affecting CIO organizations and their membership. The statement said that the CIO plan would give CIO organizations "within such a department every right, privilege and opportunity of controlling the affairs of those not holding membership in the CIO department."

Apparently intended to make the point that the CIO spoke in larger terms than its position in the organized labor movement justifies, the AFL committee took a fling at CIO's "extravagant and unsupported claims of membership." The AFL committee, touching a CIO sore spot, said that "on an analysis it was clear that the CIO has little, if any, dues paying membership other than the members of the organization that originally belonged to the AFL."

CIO Needs Money

The view has grown that, denials to the contrary, CIO is desperately in need of funds and unless they are forthcoming soon will face collapse. Some think its bold demands are based on the precarious financial condition and internal dissension in which it finds itself and are put forth as a "front" to encourage new and dues paying members and are subject to trimming down if it sees a chance of making peace with the AFL. But breakup of CIO, in the opinion of those who think it is near the rocks, distinctly would not mean a bust up of all of its affiliates by any means.

On the contrary there is an

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opinion that such organizations as SWOC under the guidance of such an able leader as Murray, with a good labor record, would survive, either as independent unions or that they would return to AFL. This conception of course is scorned as propaganda by CIO leaders. It may be wrong. Nevertheless it prevails.

U. S. Sells 3 Old Ships to Britain

WASHINGTON, Nov. 2.—Completing the sale of 25 obsolete steel cargo vessels in its laid-up fleet, tenders for which were opened Oct. 20, the United States Maritime Commission accepted the bid of G. E. Marden, New York City, a British subject, for three remaining ships aggregating 24,657 tons, for operation abroad. Mr. Marden submitted individual bids totaling $194,500. The commission realized $991,111.93 on the 22 ships sold previously making a total of $1,185,611.93 for the 25 vessels.

Surplus Tax Reduced Jobs

ONE-FOURTH of manufacturers questioned in a recent National Association of Manufacturers poll regarding effects of the surplus profits tax reported that if the tax "were lifted they were positive more employees would be required."

Another fourth stated they "probably" would hire more men if the tax were removed while 68.7 per cent said they were paying out uneconomically large dividends and 18.5 per cent reported themselves handicapped by the tax in paying debts.

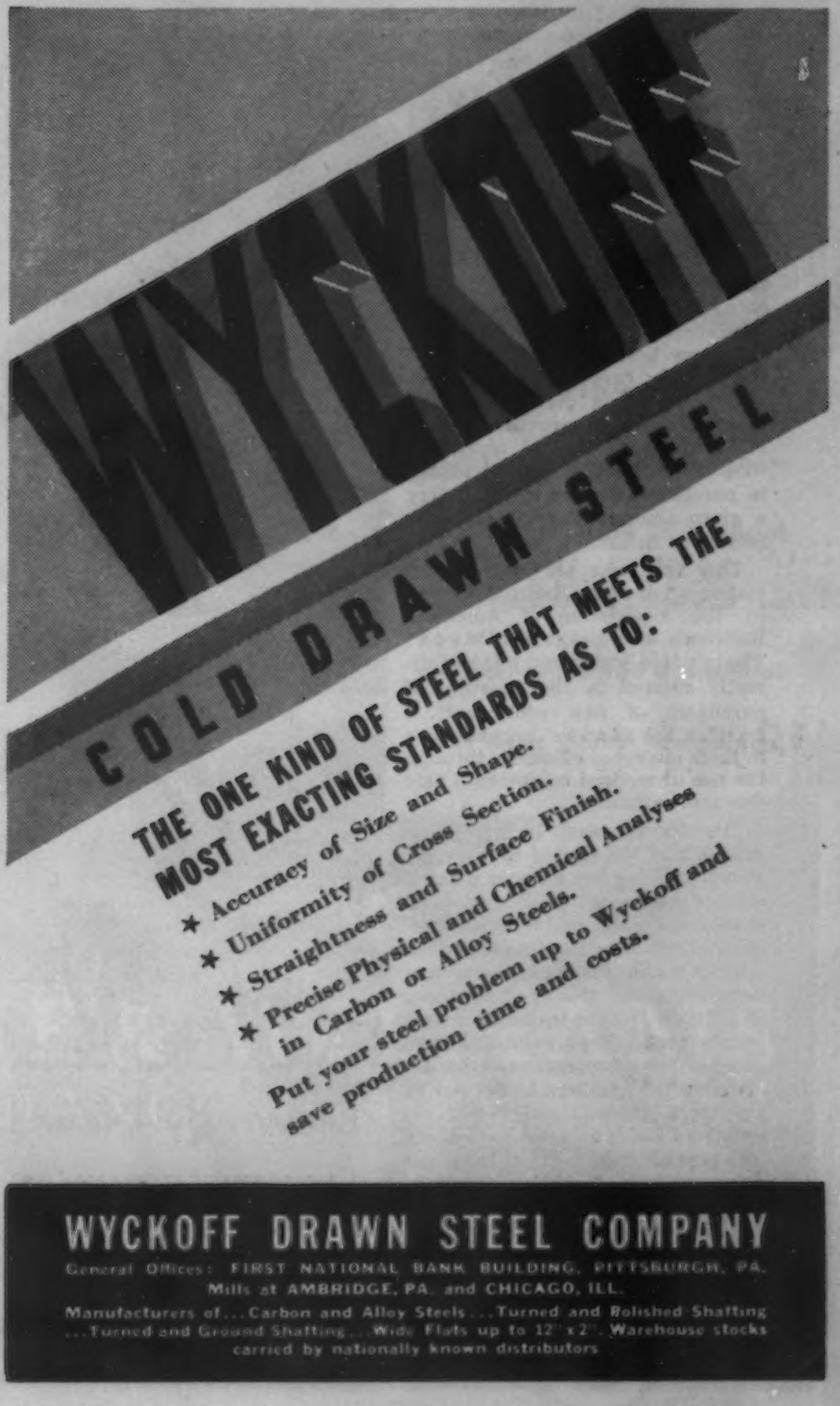
"Thus it would appear," the association stated, "that there can be little real expectation of sound business expansion and further employment gains until the surplus profits tax is either repealed or drastically amended."

The Hagan Corp., Pittsburgh, has received an order from the International Paper Co. for automatic control for three boilers in the Niagara Falls, N. Y., plant. Another contract calls for a combustion control unit in the plant of the Taggart Oswego Paper Co., Oswego, N. Y.

Cost, Not New Equipment, Is Railroads' Biggest Problem

WASHINGTON, Nov. 2. — Doubt still exists that substantial equipment purchases by the railroads before next spring, if then, are in prospect even if the Interstate Commerce Commission grants further increases in freight rates and passenger fares.

Formal decision to apply for a 15 per cent freight rate increase above that allowed on basic commodities under the ICC decision of Oct. 22 was reached at a conference of the Association of American Railroads in Chicago last week. The carriers had previously said this action would be taken because of the inadequacy of the estimated $47,500,-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000 increased revenue expected from the decision.

As pointed out here increased railroad purchases on a large scale is not an immediate necessity while the question of getting more revenue to meet mounting costs is pressing. These include higher prices of materials, increased taxes and wage rises.

To indicate there is no urgent need of heavy equipment purchases, railroad interests point to the sag in business with a resultant drop in carloading since the week of Oct. 2, when the peak of the year, 847,000 cars, was attained after a steady rise — with infrequent exceptions — which set in in July. Since the high point was reached early in October there has been an unseasonally downward trend for the peak ordinarily is not reached until about Oct. 15.

Further reference is made to the comparatively heavy purchases during the current year.

For the first nine months Class 1 railroads installed 56,307 freight cars, the largest number for any corresponding period since 1930. In the same period last year, 27,178 new freight cars were put in service and 3172 in the same period two years ago. Improved efficiency of railroads also is an important item which makes it unnecessary to purchase as many cars to carry a given amount of traffic as were necessary in earlier years.

This fact was set forth in its statement on "The Railroad Crisis" by the Association of American Railroads at Chicago last week. Though this statement was not directly related to the question of purchases of new equipment, it fortifies the carriers' argument as to their improved efficiency through the use of modern equipment. Said the association:

"During the past 15 years, the railroads of the United States have shown striking progress in making transportation more efficient, more economical, safer and more serviceable. They have run longer trains, where traffic justified them, and have increased the average speed of all their freight trains by nearly 50 per cent. They have abolished general car shortages, not by increasing the number of cars but by the more efficient and better coordinated use of an actually reduced number of cars. They have cut down grades, straightened curves, strengthened bridges, improved signals, built better locomotives and cars—in a word, they have all but revolutionized freight service, as will be recalled readily by those familiar with transportation fifteen years ago. And, while improving the service, they have produced it more cheaply and sold it at a lower average price."

But like other business groups the railroads are constantly faced with hampering legislation which promotes increased costs, which will not improve their service. An example is the pending 70-car train bill before Congress. It passed the Senate. The Association of American Railroads estimates that this measure would increase out of pocket operating costs approximately $125,000,000 annually on the basis of 1930 traffic and approximately $90,000,000 on the basis of the depressed traffic of 1936.

But as a long-range proposition increased revenues manifestly will mean substantial purchases of equipment as a vital necessity for continued efficiency of railroad transportation.

As pointed out by the association's statement issued from Chicago:

"Without adequate revenues, railroads, just as any other business, find it impossible to spend the money they would like to spend—and in the interest of continued progress in efficiency and economy should spend — on maintenance of way and structures, and on improvements in plant, facilities and equipment.

"Instead, they are compelled to cut down forces and curtail purchases. And that means not only a reduction in railroad employment but also a decrease in employment in various other pivotal industries, from which railroads are normally heavy purchasers.

What Carriers Consume

"The importance of railroad purchases can be gaged partly by the fact that, under normal conditions, they buy and consume:

"23 per cent of all the bituminous coal mined in this country;

19 per cent of all the fuel oil produced;

"17 per cent of all our iron and steel production;

"20 per cent of all our cut of timber."

Those who argue the necessity of much higher railroad net revenues as an alternative to railroad bankruptcy or Government ownership were impressed with the railroads' Chicago statement that already a total of 96 railroad companies are in the hands of receivers or trustees, and are being operated under the supervision of the courts because they have found it impossible to meet their obligations. These companies, the statement said, operate 71,386 miles of railroad line or 28.1 per cent of the total railroad mileage of the United States. This, it was added, is the largest percentage of mileage ever in the hands of the Courts at any one time in the history of American railroads.

Continuing, the statement said:

"On Oct. 22, 1937, the Interstate Commerce Commission authorized a restoration of a portion of their loss of revenue by small increases in rates on certain specific commodities, estimated to yield about $47,500,000 a year—a step in the right direction, but obviously inadequate to meet the necessities of the situation.

Must Ask Increase

"As costs have increased since May, 1933, in the amount of $663,303,000 per year, the railroads have no recourse other than to submit to the Interstate Commerce Commission their application for an increase generally in their charges for both freight and passenger service."

What the ICC may do with respect to the new application for further increases in freight and increases in passenger rates remains to be seen. The general view, based on the ICC report of Oct. 22, is that it will get sympathetic consideration.

AFL, CIO Snipe Away At Measure Drawn By New Deal To Aid Labor

WASHINGTON, Nov. 2.—Organized labor's repeated snippings at the pending wage and hour bill is proving embarrassing to Administration adherents who hope for early enactment at the forthcoming session but who have discovered the difficulty of whipping up sentiment for legislation designed to espouse the cause of the working man when labor itself virtually turns thumbs down on the move.

New Deal lieutenants, who breathed easier last session after William Green, AFL president, rushed up to the Capitol in an eleventh hour request for passage,

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were jolted anew when the federation, in its Denver convention, launched new criticism against the bill.

The AFL approved a committee report which assailed the measure on the ground that it constituted an intrusion on the workers' rights to improve their economic status by collective bargaining.

Labor's apparent indifference to the bill has been manifest almost from the time the measure was sent to Congress last session, fresh from the pens of Tommy Corcoran and Ben Cohen, ace New Deal law-writing scribes. John P. Frey, who heads the federation's metal trades division, has been more openly hostile to the bill than have most labor spokesmen.

John L. Lewis described the bill as "that poor, halting wages and hours bill that finally emerged from the committee," at the CIO's recent Atlantic City conference.

The House Rules Committee—one committee from which the measure did not emerge last session—will be watched closely when the special session convenes. It is generally agreed that Southern opposition and efforts of unsympathetic Republican members were successful in keeping the measure blocked in committee merely because time was not available in the busy hours of a closing session to extricate the measure.

John J. O'Connor, Democrat of New York and chairman of the committee, forecasts prompt extradition to the House floor when Congress returns but concedes he has been "embarrassed" by the attitudes of the two rival labor camps.

"You don't give a man something he doesn't want," O'Connor says.

Legislation Possible

Despite the opposition from labor, it is difficult to find observers in Washington who are willing to discount completely the possibility of wage and hour legislation at the approaching session. It is pointed out that the bill will probably take on new form after Congressional leaders return and complete the task they started last session; that is, revise the draft, a step which was abandoned in the heat of the court-packing battle.

Wage and hour law critics say that New Deal henchmen who predict prompt passage of the measure are "blowing on the wrong whistle," and that the days of pushing hastily-drawn laws to speedy enactment are over.

Trade Groups Watch

Trade groups with headquarters in Washington are watching developments closely. They are interested not so much from the standpoint of wage and hour standards—most of the industries represented have already inaugurated higher standards—but because of implications that lead up the avenues of further Government control.

Specifically, they are keeping their eyes peeled on sections of the bill which would empower a labor standards board to investigate company records even though the particular company was exempt from the law, or was already committed to higher labor standards.

Lukens Steel Co. Denies Merger Talk

ROBERT W. WOLCOTT, president, Lukens Steel Co., Coatesville, Pa., informs THE IRON AGE that published reports of a prospective merger of the Lukens company and the Alan Wood Steel Co., Conshohocken, Pa., are without foundation.

These new cranes travel at 170 feet per minute with a five ton load. They operate over the entire plant area interlocking for passage of hoists from bridge to bridge. Cranes and hoists are propelled by low horse power MonoTractors all from floor control.

These rubber wheel drive units make low-cost handling possible. They have been successfully applied to all overhead trolley equipment with a wide variety of automatic controls. Engineering service is available without obligation.

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AFL Wage Data Ignore Relation Of Labor Cost To Operating Rate

WASHINGON, Nov. 2.—Labor spokesmen often complain that price rises are greater than wage increases, but even where this situation prevails too frequently the complainants overlook economics of the problem.

An example is seen in the 1937 report of the Executive Council of the American Federation of Labor. On page 117 parallel stacks of coins illustrate rising prices and wage costs from January, 1935, to January, 1937, in steel, lumber, chemicals, gasoline, shoes and cotton goods. Credit for the calculation is given to the Department of Labor. The steel wage increase is given as 2 per cent. The steel price increase is given as 12.5 per cent.

A fundamental objection to the calculation, regardless of whether the price-wage ratios are correct, is that no consideration is given to the relationship of labor requirements to the rate of operation. Without this factor being projected, the conclusions drawn as to price and wage increases are misleading.

The period covered by the Federation study leads directly up to but does not include wage increases in January, 1937, to say nothing of subsequent wage advances. But the principal point is that the illustration covers a period whose average rate of operation was low with resulting high labor requirements per ton of output.

As is well known, steel mills, geared for high-speed volume production, are most efficient when operating close to capacity. When the mills slow down labor costs rise because of the increase in man-hours required to produce a ton of steel.

Shown By Analysis

The Department of Labor pointed out these facts in a study published in *The Monthly Labor Review* for May, 1935, with a table showing how the man-hours required in the production of steel increase as the rate of operation declines. The results are based on statistics published by the American Iron and Steel Institute.

The table indicates that in the manufacturing process alone, the average man-hours per ton of finished steel products advances from an average of 34.43 when the mill is operating at between 55 and 60 per cent of capacity to 46.48 when the rate of operation drops to between 20 and 25 per cent of capacity, an increase of 35 per cent.

At the same time, as pointed out by the Bureau of Labor Statistics, the man-hours required for administration more than double, being 3.26 when the mill is operating at from 20 to 25 per cent of capacity as compared with 1.32 when the operating rate is between 55 and 60 per cent.

How Costs Vary

Going back to January, 1935, the beginning of the period of the AFL price-wage comparisons, the rate of steel operations was 45 per cent of capacity and the average wage 65c. per hour. At that rate, according to the Bureau's figures, it requires an actual average of 40.63 man-hours to produce a ton of steel, giving an index of 118 based on 100 at the rate of 55 to

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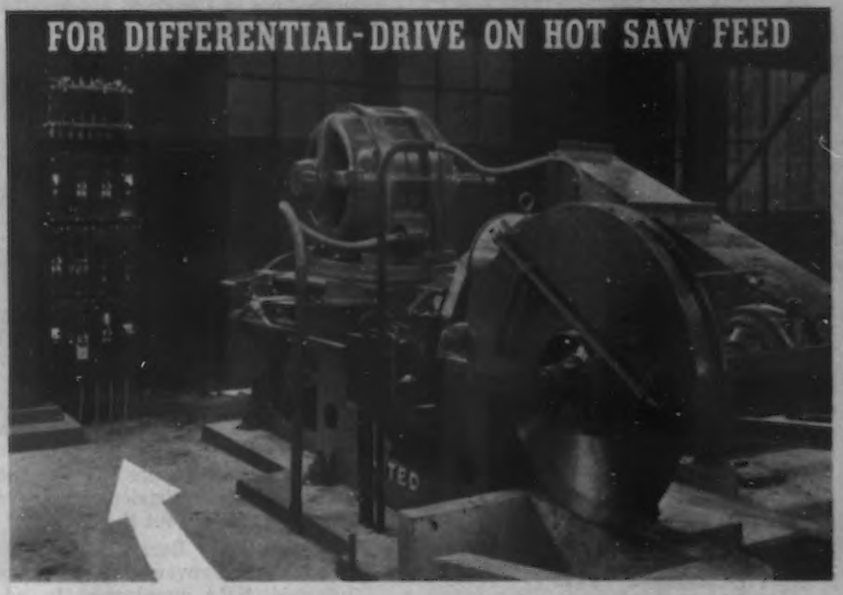

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60 per cent of capacity when the average man-hours required to produce a gross ton of all products is given as 53.

On the basis of January, 1935, operations it required an average of 62.5 man-hours to produce a ton of steel including extraction, transportation and manufacture, arrived at by multiplying 53 by 118. At an average wage of 65c. the labor cost was $40.62 per gross ton, while the composite price of finished steel, according to THE IRON AGE, was 2.124c. per pound, equivalent to $47.58 per ton.

Wage Cost Less

In January, 1937, operation was at a rate of 80 per cent, taking an index of 82, and wages averaged 73.3c. per hour or 17.7 per cent above the January, 1935, average. This higher rate of operation reduced man-hour requirements to an average of 43.5. Finished steel prices rose to 2.33c. per pound or an equivalent of $52.19 per ton in January, 1937.

Thus the labor cost per ton of steel in January was $40.62 (65c. x 62.5) as compared with $31.88 in January, 1937 (73.3c. x 43.5).

The price increase in January, 1937, over the corresponding month two years previously was $4.61 or 9 per cent, 8.7 per cent less than the wage increase. Meanwhile, of course, costs of materials and taxes rose, with the sole exception of the price of ferromanganese, as shown by the following comparison, based on THE IRON AGE quotations:

	January, 1935	January, 1937
Scrap, per gross ton...	$12.18	$18.33
Pig Iron, per gross ton	17.90	20.25
Ferromanganese, per gross ton	85.00	80.00
Taxes, per gross ton ..	3.20	3.32
Tin, per pound	50.91c.	50.98c.
Zinc, per pound	4.08c.	5.72c.

Cites Charges, Overhead

It is also to be kept in mind that the industry in January, 1935, operating at 45 per cent of capacity, was in reality producing at the rate of 22,000,000 tons of finished steel a year, while in January, 1937, operating at 80 per cent of capacity, the industry was producing at the rate of approximately 40,000,000 tons of finished steel annually.

It follows that all the fixed charges and overhead in 1935 had to be absorbed by 22,000,000 tons of products, while in January, 1937, fixed charges and overhead could be spread over 40,000,000 tons, thereby greatly reducing the average ton cost. Consequently it is clear that no comparison of the relation between wages and selling price is fair unless the factors of fixed charges and overhead are also taken into consideration.

It is likewise true that since January, 1937, there has been a sharp increase in wages, bringing the present-day average above 85c. per hour, or 30.8 per cent over the average wage in January, 1935. Furthermore, there has been a substantial reduction since the first of the current year in the rate of operations.

So it is evident that the American Federation of Labor has used Department of Labor figures, which in themselves are not challenged, to show only a part of the whole picture.

Senator Berry Holds Labor Groups Favor His Wage Proposal

WASHINGTON, Nov. 2. — Anticipating renewed opposition to the pending wage and hour bill, Administration supporters in Congress are moving in the direction of revision, the latest plan being advanced by Senator George L. Berry who, for more than a year as President Roosevelt's Industrial Coordinator, was the New Deal's "hope" for NRA revival.

The Berry proposal, calling for establishment of a 40-hr. work week and a minimum wage of not more than 35c. an hour nor less than 30, is designed to meet opposition from all quarters against the existing bill. Even the so-called Labor Standards Board, called for under the Black-Connery measure, would be eliminated under the Berry revisions and administration would be placed in the hands of the Department of Justice through the United States district attorneys scattered throughout the country.

In this way, Berry, who maintained a carryover staff of some 100 odd NRA employees to administer a program which critics said did little if anything to justify its existence, believes that the creation of a new governmental agency will be unnecessary.

With the same optimism with which he called the ill-fated industrial conference while he was acting as coordinator, the Senator insists he has yet to find "a single man" who opposes his wage-hour proposal. He intimated that the plan is satisfactory to labor, explaining that he had discussed the move at the recent "peace conference" between CIO and AFL factions.

The Senator has been a persistent advocate of conciliation between the two groups and it has been pointed out that his affiliation with John L. Lewis as a member of Labor's Non-partisan League and his connection as president of the Printing Pressmen's Union, an AFL affiliate, would give him definite advantages as a mediator in any move to patch up differences. In any event, if the Berry bill is looked upon with favor by both labor groups, as the Senator infers, its chances for success would admittedly be considerably bolstered.

Holds Minimum Right

Although the Tennessean, in advancing the cause of his measure, contends that the Black-Connery bill would create conflicts and tend to "drive business out of business," it is recalled that he voted for the measure when it passed the Senate.

One complaint repeatedly made against the pending wage-hour bill which Berry believes will be overcome by his proposed revision is that too high a minimum wage would deter collective bargaining and tend to establish a maximum rather than a minimum wage. He feels that his bill just about hits the nail on the head, conceding, however, that the proposed 40-hr. maximum work week is only tentative and may have to be lowered.

Coming from the South, where opposition to Federal control of wage and hour standards blocked passage of the Black-Connery measure last session, Berry follows in the footsteps of former Senator Hugo L. Black who sponsored the pending bill and who, authoritative sources say, faced possible defeat for his Senate seat because of the sponsorship had he not been named to the Supreme Court by the President.

Other developments on the wage-hour front include the report that the Administration is putting finishing touches on another measure, presumably differing with both the pending bill and the Berry proposal. Administration lieutenants, including Representative Ramspeck, Democrat, of Georgia, ranking member of the House Labor Committee, are reported to be in a huddle frequently on a wage-hour bill which, the President said in a recent radio talk, is one piece of legislation "the American people immediately need."

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. . PERSONALS . .

CASSIUS F. BIGGERT, for 47 years vice-president in charge of the iron and coal mines and Wisconsin Steel Works of the International Harvester Co., retired Nov. 1, and will be succeeded by GEORGE E. ROSE, Mr. Biggert's assistant since August, 1936, who has just been elected a vice-president.

Mr. Biggert began service in 1890 in the stores department of Deering works and by 1898 was in charge of all raw material purchases except lumber and fiber, devoting himself especially to steel supplies. In 1904 he was called to the general office of the newly formed Harvester company and in 1915 was made assistant to Herbert F. Perkins in the conduct of the company's steel and coal operations. He was elected a vice-president in 1931.

Mr. Rose has had 36 years of experience in the steel industry, 31 of which were spent with the Wisconsin Steel Works. Upon graduation from Princeton University in 1901 he was employed by the Carnegie Steel Co. at Braddock,

C. F. BIGGERT

G. E. ROSE

in the blast furnace department. By successive promotions he became assistant to the superintendent of blast furnaces, holding that position in 1906 when he began Harvester service as superintendent of blast furnaces at the Wisconsin Steel plant. He was promoted to assistant general superintendent of the steel works in 1909 and in 1912 was appointed general superintendent.

❖ ❖ ❖

EDWARD A. BROWN, JR., has been appointed assistant to the general superintendent of Carnegie-Illinois Steel Corp.'s Duquesne works, Duquesne, Pa. He was formerly assistant to the chief engineer in charge of fuel and steam at the

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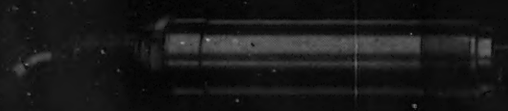

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BRANCHES IN PRINCIPAL CITIES

Homestead works. He is a graduate of Carnegie Institute of Technology and in 1911 began his career as an engineering department tracer and detailer at the Homestead works. He later was appointed assistant to the Homestead mechanical engineer and in 1935 was placed in charge of the steam department, in connection with his duties as assistant to the mechanical engineer. On Aug. 1 he was appointed assistant to the chief engineer, which position he held until his recent appointment.

E. A. BROWN

L. S. DAHL

❖ ❖ ❖

LAURENCE S. DAHL has been appointed assistant general superintendent of Carnegie-Illinois Steel Corp.'s Irvin works at Irvin, Allegheny County, Pa. He was formerly superintendent of the hot strip mills at the Gary, Ind., sheet and tin division of Carnegie-Illinois. He began his business career in 1924 as a machinist and roll turner and later worked in the mechanical erection field for several companies. In 1927 he became an erection foreman during construction of a 42-in. mill for the American Sheet & Tin Plate Co. and later was named roll shop foreman. In 1931 he was appointed night superintendent of the 42-in. hot strip mill and later superintendent of cold reduction and tin mills. Upon merger of the tin plate company with Carnegie-Illinois in 1936, Mr. Dahl was appointed superintendent of sheet mill, cold reduction, annealing and temper mill departments. He later was appointed superintendent of the hot strip mills at Gary in which capacity he continued until his recent appointment.

❖ ❖ ❖

D. ROBERT YARNALL, chief engineer, Yarnall-Waring Co., Philadelphia, has been elected president of United Engineering Trustees, joint agency of the American Society of Civil Engineers, American Institute of Mining and Metallurgical Engineers, American Society of Mechanical Engineers, and the American Institute of Electrical

(CONTINUED ON PAGE 84)

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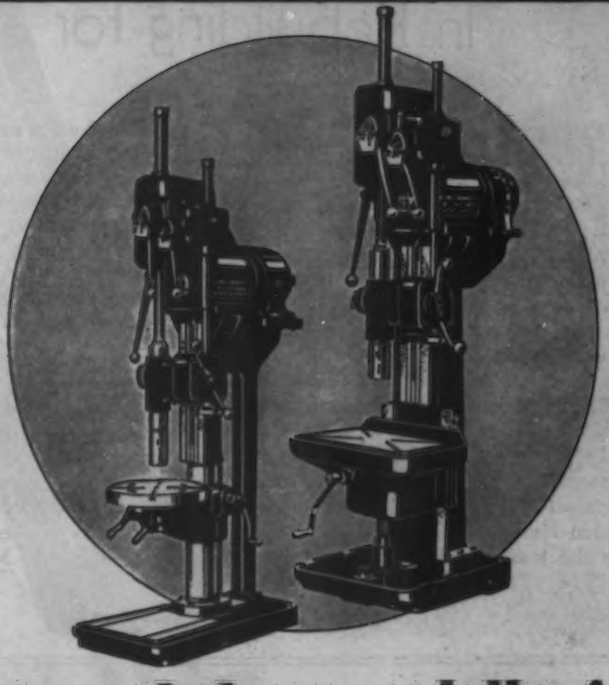

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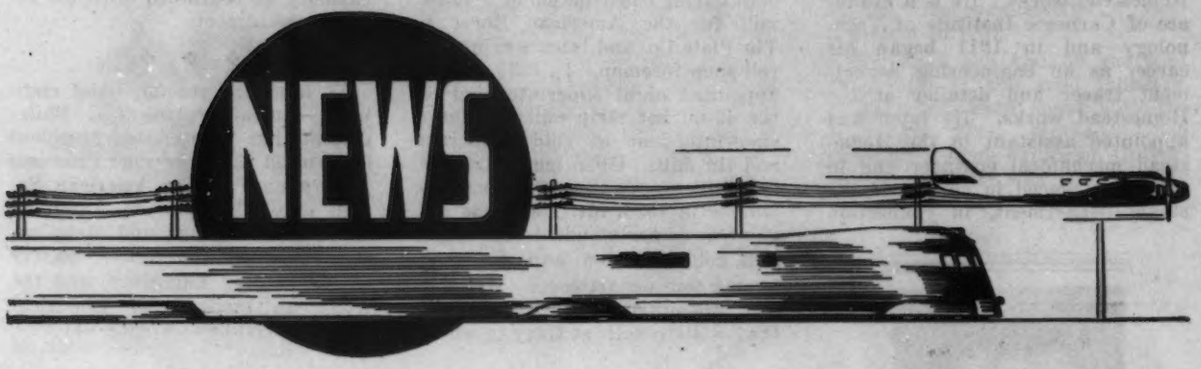

Structural Steel Fabricators See Big Future In Rebuilding for a Motor Age

THAT the future progress of steel construction in the United States depends to a large extent on the rebuilding of cities and country highways to conform to the needs of an automobile age was a dominant theme at the 15th annual convention of the American Institute of Steel Construction at the Greenbrier Hotel, White Sulphur Springs, W. Va., on Oct. 26 to 29. The institute has recently taken cognizance of this situation by the introduction of a national campaign in which $9,000 is offered in prizes for the best design for an elevated highway that will help to solve the traffic problems.

Elevated highways are necessary for the relief of traffic congestion in our cities, according to Henry M. Stevens, vice-president of the J. Walter Thompson Co., New York, which has been making extensive surveys on behalf of clients who are interested in this problem. He cited the many projects that have been built of steel as a partial solution of city congestion, such as the West Side elevated highway in New York, but said that much more remains to be done. As an illustration of the points he brought home, he showed the motion picture, "The City of Tomorrow," which was worked out along imaginary lines by Normal Bel Geddes, noted stage designer, in cooperation with Dr. Miller McClintock of the Harvard University Bureau of Street Traffic Research. While the picture presents a Utopian concept of the city of the future, it also gives many practical illustrations of how buildings and streets will be constructed in order to relieve traffic and parking conditions.

E. J. Russell of St. Louis, former president of the American Institute of Architects and member of the city planning commission of his city, told of steps that are being taken in St. Louis to relieve traffic, one of them being the condemnation of a large tract in the business

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OCCASIONALLY some new development is made that alters the standards throughout a whole division of industry. The newly announced exclusive nitrogen hardening process of Sheffield plug and ring thread gages has caused such a great deal of comment that it has become a case in point.

The process itself is important only because of the phenomenal results obtained. Its trademark name is "Chapmanizing", a patented process of introducing nitrogen into the gage surface at high temperature to obtain a very hard, dense, abrasion resisting case . . . but still retaining the physical properties of the tough, elastic core of the gage. Thus maximum wear resistance is combined with maximum strength and resistance to breakage or cracking.

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Structural Steel Bookings

T. H. Hendrix, director of statistics of the institute, analyzed the bookings of fabricated structural steel to show how far recovery in steel construction has come from the lows of the depression. Bookings in the first eight months of 1937 showed a 12 per cent increase over those of the same period in 1936, were 14 per cent less than the contracts placed in the first eight months of 1931 and greater than the bookings in the full years 1932, 1933, 1934 or 1935. "As an indication of how far we have come from the low point of the depression," said Mr. Hendrix, "bookings for the first eight months of 1937 show an improvement of 112 per cent over the same months of 1932."

He added that since the 1932 low the volume of structural steel business has shown a slow but steady improvement, but this year's volume is a long ways behind the operations of the years 1928 and 1931. Using those years as a normal period, the bookings in eight months of this year represented an operating basis of 64 per cent.

Mr. Hendrix commented on the fact that bookings this year have been very erratic—up one month and down the next, with very little relationship or similarity to the experience of past years. He said that this makes it practically impossible to plot the future trend or make any predictions as to the prospective volume of business. The steel volume, however, has maintained its usual relationship to the general construction total.

During the first eight months this year 38 per cent of the structural steel sold went to industrial and commercial buildings as against a total of 31 per cent in 1936. Government work, which constituted a large portion of the structural steel sold in 1936, declined from 48 per cent last year to 38 per cent in the first eight months of this year. Bridge and grade crossing elimination, included in Government work, accounted for 33 per cent in 1936 as against 25 per cent this year. Tonnages going into institutional buildings has shown a slight decline. The tonnage sold for railroad bridges has declined from 4 per cent to 3 per cent, while railroad buildings have shown a slight upward trend.

Mr. Hendrix's analysis showed that a greater part of present bookings are for private enterprise rather than for Government projects. Another interesting fact brought out is that small unidentified jobs taking less than 50 tons each have accounted for 18 per cent of this year's total against only 12 per cent last year. Of this year's business 42 per cent was made up of jobs of over 1000 tons each and 58 per cent in jobs under 1000 tons.

Government Regulation

In his opening address to the convention, Clyde G. Conley of the Mt. Vernon Bridge Co., Mt. Vernon, Ohio, its president, discussed, among other things, the complete overhauling of the anti-trust laws that is promised by the Administration.

"Are we to understand," asked Mr. Conley, "that our political leaders have failed to learn well the lessons of 1933-34? Industry in this country has grown great because we have followed a system of competition. The purpose of the anti-trust laws was to preserve the freedom of competition. We would

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When manufacturers need alloy or tool steel tubing they call for Bisco. They know we devote all of our time and energies to this one type of product, and the product reflects the skill in its making.

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The Tubing Specialists
Cleveland, O.

never have had any demand for a change in these laws had we been mindful of the rights to free competition and careful to restrain all forms of commercial license. If license has grown so rampart as to warrant the intervention of the Government, then probably we deserve no better. It should be made impossible for any company to compete so freely as to destroy either its competitor, itself or the industry or to injure the customer. I, for one, do not believe we have reached such a dire extreme. Through voluntary cooperation we can erect that measure of self regulation as to make governmental interference unnecessary. If industry in the United States is preparing to accept a fascist command, then I fear that we will have to abandon all spiritual progress made during the past three centuries.

"In 1933, we attempted to cooperate with the Government and set up a code for this industry. We believed then we were engaged upon a necessary but a temporary expedient. We have discovered during the past two years that a greater level of business ethics can be achieved upon a cooperative basis. The success of this voluntary effort is greater proof of this than any academic arguments that can be advanced for a change in the anti-trust policies of the United States at this date. At this crucial day in our political life let us continue to do all within our power to preserve the elements of democracy for a guide to the rest of the world.

"It is not just a depression we have passed through. We have come through a period of the Great Illusion, the vain hope that we can find a law that would legislate cutthroat competition out of existence. In every instance that we have gone to the Government seeking relief we have done little better than surrender the control of our businesses. Today our industry, for one, is coming to think less about how to do what it is not permitted to do and to think more about how to do the right thing for itself instead of inviting the Government to do the job for us. If this is being disillusioned, then I, for one, am not ashamed to admit it. We are not looking for pie from Washington.

"But the problem of selling at a profit is still with us and is very much the problem of the industry. We cannot fix prices and have no desire to do so. The law will not permit it, if we would or could. But that does not mean that there are not perfectly sound, legitimate and sensible ways of achieving improved income by the means that are left to us. It would be a tragedy beyond measure if, because prohibition failed, temperance should no longer have its advocates. And just as these earnest exponents of temperance are proceeding with education instead of compulsion and regulation instead of control, so must industry proceed, in its own thinking, to reduce and alleviate the destruction caused by price cutting."

V. G. Iden, secretary of the institute, discussed the work the organization is doing along various lines and stressed the importance of a sound public relations program. Instead of petitioning the Government for special legislation,

For accurate screening of minerals, chemicals and all hard-to-screen materials. Special layouts and sizes to insure maximum production with minimum screening costs.

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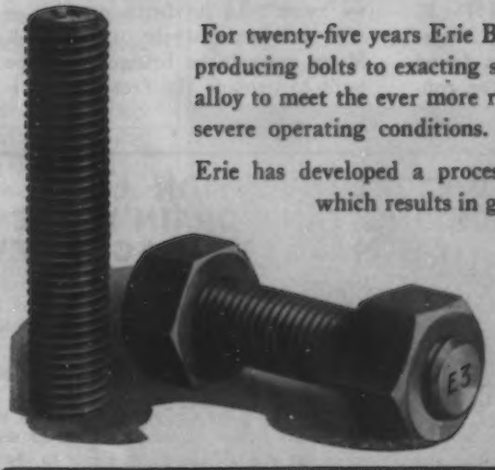
ERIE BOLTS



For twenty-five years Erie Bolt & Nut Company has been producing bolts to exacting standards made of the proper alloy to meet the ever more rigid specifications imposed by severe operating conditions.

Erie has developed a process of manufacturing threads which results in great accuracy and smoothness of thread, thereby eliminating, to some extent, seizure under high temperatures.

Write for two new close tolerance thread specifications developed by Erie.

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he pointed out, industry could serve itself better through the development of its product to serve mankind better. Not only research but market development and advertising should be undertaken to tell the world what great things can be built of structural steel, he said.

Edward L. Ryerson, Jr., vice-chairman of the Inland Steel Co., Chicago, said that American manufacturers have added 3,100,000 workers to their payrolls since the WPA was organized in 1935. These new workers total 65,000 more than were on the WPA payrolls at its peak on Feb. 29, 1936, Mr. Ryerson said.

"And yet," he added, "the WPA on Sept. 25 still had 1,452,874 workers on its projects."

Business faces taxation beyond its capacity to pay unless the great majority of employables now on WPA are, within a short period of time, encouraged or compelled to find jobs in private industry, Mr. Ryerson declared, and continued:

"I am now convinced that the time has come when we must stop talking so much about industry and commerce making jobs available. Rather, the emphasis must be placed upon the individual to find employment. We all know that there actually is a shortage of available labor in many trades. The obvious implication of our highly developed relief program has been to create an attitude of mind that makes a large mass of our citizens assume that a job or its equivalent will be provided without the necessity of seeking one."

Construction Trends

"In a recent study of trends of construction growth," said F. E. Schmitt, editor, *Engineering News-Record*, New York, "it was found that the normal demand for construction is increasing at the rate of about 25 per cent every 10 years, and from a study of the factors involved in this growth it was concluded that the trend could safely be projected one or two decades forward as a measure of normal conditions. Taking the normal construction demand as of 1930 at 8½ to 9 billion dollars, we would thus be justified in counting on a 1940 normal of about 11 billion. When we apply this same ratio of growth to steel construction, we find that the present normal requirement, which may be placed at 3½ million tons, will be increased to about 4½ million tons by the end of the next decade.

"Necessarily such an estimate leaves out of account the depression sag. The industry is still little above half normal production, and it would take inspired prophecy to say when completion of our economic and industrial recovery will be reached and with it the full normal demand for fabricated structural steel. Even apart from the depression, however, the estimate involves the assumption that the market for steel construction will not undergo any important change, as through the advent of some new and exceptionally strong competition. But at present no such change is in sight, and the forecast may therefore be held to apply for at least the 10-year period just ahead.

"That there is much room for growth in requirements for steel is hardly in need of argument. The scale of construction undertaking is increasing notably from year to year, and with it the demands made upon steel construction must grow correspondingly. We have only begun on development of an efficient national road system, and we know that its further progress will call extensively upon steel. Many more large bridges must be built to provide the free communication that present times require. At the same time many thousands of obsolete small bridges must be rebuilt, a need that is being more and more seriously felt. We have to remember also that the necessary expansion of the country's industrial plant has only begun, and that in view of the rapid obsolescence of modern manufacturing facilities it promises to be a continuous process. Conditions warrant us also in looking for resumption of major city building within a year or two. It is useful to note these conditions as the return to normal approaches, for they confirm the view that the outlook into the future is not unfavorable."

Steel Frame Housing

A potential market for 1,500,000 tons of steel annually for steel frame houses exists in this country, according to F. T. Llewellyn, research engineer of the United States Steel Corp., who has made extensive surveys of this field, but he pointed out that it would be a mistake to conclude that any such market is just around the corner.

"Many attempts have been made to use light gage steel for residence framing on the assumption that steel is a cheap material," said Mr. Llewellyn. "On the contrary, it may be a most expensive material unless used with a proper appreciation of its true function. The only way in which steel can be used economically and in normal competition with other materials is to place it where, and only where, full advantage can be taken of its excellent characteristics.

"A rather common mistake is to assume that light gage members can be produced cheaply merely because a large footage of a given section can be formed rapidly with the aid of suitable equipment. Enthusiastic exploiters are apt to overlook the high cost of amortizing such equipment, as well as the

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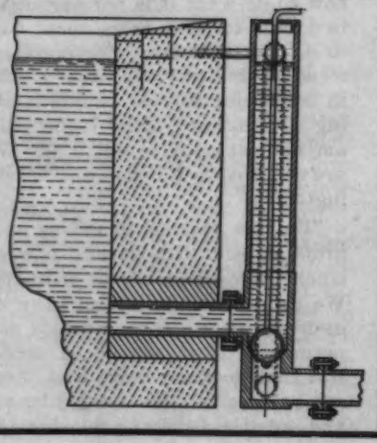

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Length Turning Capacity Now Multiplied

Every Monarch Anti-Friction Taper Attachment, when equipped with the taper attachment Variator, will turn any taper within its capacity *for the full length between centers of the lathe . . . and at one setting of the taper attachment.*

Only one set of pick-off gears, for the geared bed bracket, is required to increase the length turning capacity of the taper attachment (at one setting) to the maximum length turning capacity of the lathe. Equipped with this set of change gears, it is possible to turn any lesser length of taper and any lesser degree of taper, setting the swivel of the taper attachment . . . according to a simple formula furnished with each attachment.

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outlay for a variety of collar or die changes, and to underestimate the expense of providing the formed sections with the necessary attachments. A measure of the economy attainable by multiple production should not be replaced by mere hopeful guesses.

"Extreme caution is urged in assuming that a large group of houses can be constructed by multiple production methods as cheaply as can the same number of automobiles. In some cases the individual parts of a house could thus be produced at the factory provided they were suitably designed, but in all cases the relative cost of distribution, supervision and financing per finished house will be much greater.

"Many of the systems of residence construction using light gage steel that have been tried out are satisfactory from every standpoint except first cost. This applies particularly to low-cost housing, less so to medium-priced houses, and to an almost negligible extent in houses costing $15,000 and more. In a keenly competitive market, such as that of low-cost housing, there appear to be only two ways in which psychological resistance to a new material, such as steel, can be overcome. Either a campaign of education must be undertaken to explain and impress the advantages of steel, or else steel construction must be offered at a lower cost. Real estate men state that the public is not yet satisfied to buy steel houses at the same price as conventional construction and that steel houses will not be in general demand unless they are offered, at least for introductory purposes, at a concession in price.

"Inexpensive houses can be built, of course, by leaving out all the conveniences which the American public has come to regard as desirable but this would hardly be considered as a solution of the problem.

"It may be more than a mere coincidence that the year which saw the inception of many of the newer systems of house construction was 1932, marking the depth of the depression. At that time (and in some quarters the idea persists even today) it was hopefully predicted that this new industry, steel housing, would speedily sail the United States out of the doldrums into the bright waters of prosperity.

"It need hardly be pointed out that any new industry must walk before it can run. The author suspects that the future of steel in residence construction will be one of gradual development, but the first steps have been taken."

Mr. Llewellyn's paper has been printed in booklet form and copies are available from the American Institute of Steel Construction. All of the various systems are depicted by detail drawings and photographs, making one of the most complete surveys of this subject that has been published.

The report of the institute's chief engineer, F. H. Frankland, on engineering developments in structural steel construction was followed by a paper prepared by H. D. Hussey of the American Bridge Co., New York, on "Design, Fabrication and Erection of Rigid Frame Structures in Buildings and Bridges," which has been published in booklet form by the American Institute of Steel Construction. In this connection the committee on technical research reported on several research problems in steel construction that have been successfully carried out during the past year.

Another committee report was that on a code of standard ethics.

The

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Sleeve BEARING HEADQUARTERS

The institute's code has been rewritten and the committee will continue its work until the 1938 convention, when the revised code will be placed before the institute members for adoption.

In a final session C. Oliver Wellington of the firm of McKinsey, Wellington & Co., New York, talked on "The Fallacy of Selling Below Cost." He was followed by Robert T. Brooks, executive vice-president of the institute, who discussed various problems of the industry.

Messages from President Roosevelt, Myron C. Taylor, chairman

CLYDE G. CONLEY, of Mt. Vernon Bridge Co., Mt. Vernon, Ohio, re-elected president of American Institute of Steel Construction.

of the United States Steel Corp., and S. E. Hackett, president of the Jones & Laughlin Steel Corp., were read to the members at the banquet Thursday evening.

President Roosevelt's message read in part:

"The record of your industry during the past year has been particularly encouraging. Especially gratifying to all of us are the countless new bridges throughout the length and breadth of the land —works which will stand through the years as useful monuments to the skill and ingenuity of your craft."

Myron C. Taylor said:

"The fine start that industry experienced during the latter part of 1936, and which has continued down almost to the present in the current year, gave us all renewed hope and confidence for the future. Those in the steel industry have shown through the many years of the depression such commendable fortitude that this period of improvement was well deserved and certainly most welcome. I cannot but believe that it will be resumed in reasonable measure in the not distant future. The temporary lull is not inconsistent with those distressing activities that the aggressive ambitions and the mania for expansion both of territory and of power of one nation or another have brought to the world on so many occasions, to its great sorrow and desolation. It is of course difficult for us in what we considered this enlightened generation to reconcile some of these events either with ordinary common sense or with the dictates of humanity.

"The steel industry, and that branch of it which your association so ably represents — construction activities—is tempered in the processes of refining raw material and producing strong and enduring

Like a Good Line
A Bull Gear Has to Take It!
. . . AND NOTHING BEATS FORGINGS!
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products; it will continue as it has in the past to gird its loins to withstand whatever the fates may dictate, and will always be found doing that which your branch of the industry is constantly at work upon — the construction and upbuilding in useful ways of our civilization which, in spite of all attendant vicissitudes, is by no means at an end.

"And so we can face the future tempered by the heat of effort as well as by the disappointments of the past, but with confidence in the continued well being of an industry which keeps step with that which is best in the progress of mankind."

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Bolt products
Carefully made
To exact size
From high grade steels
Of selected hardness
And tensile strength.
Threads accurately finished
Each item a real
Standardized part
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In strong packages

CLARK BROS BOLT CO.

MILLDALE, CONN.

Steel Men Have Narrow Escape in Train Wreck

A GROUP of steel people traveling to Eastern points from the convention of the American Institute of Steel Construction at White Sulphur Springs, W. Va., had a narrow escape from serious injury when three sleeping cars of their train were derailed about 50 miles southeast of Washington. The accident happened about 3 o'clock in the morning when all were asleep. That no one was injured was probably due to the fact that the train at the moment was running at not more than 30 miles an hour. There was a delay of about two hours.

Among those on the train were the following:

Robert C. Post of Post & McCord, New York, and Mrs. Post.

Otto Gminder, manager of structural sales of Bethlehem Steel Co.; Frank L. Stephenson, assistant manager of structural sales; C. M. Denise, manager of sales of fabricated material for Bethlehem, and Mrs. Denise: Victor Ellstrom, Bethlehem sales department.

W. O. Lange, sales manager, Phoenix Iron Co., Philadelphia, and Mrs. Lange.

George Lange, purchasing agent, Phoenix Iron Co., Philadelphia, and Mrs. Lange.

A. Reese Taylor, Consolidated Steel Corp., Los Angeles.

C. N. Fitts, New England Structural Steel Co., Boston.

Daniel C. Parks, Smith & Caffrey Co., Syracuse, N. Y., and Mrs. Parks.

Clyde McCornack, general manager, Phoenix Bridge Co., Philadelphia.

F. H. Frankland, chief engineer, American Institute of Steel Construction, New York.

C. A. Brassert, Inland Steel Co., Chicago, and Mrs. Brassert.

R. D. Wood, Mississippi Valley Structural Steel Co., Chicago.

Bernard Selligman, Snead Architectural Iron Works, Louisville, Ky., and Mrs. Selligman.

C. E. Wright, managing editor, THE IRON AGE, and Mrs. Wright.

Officers Reelected

Clyde G. Conley, president; Robert C. Post, treasurer, and other officers of the institute were reelected. All directors were also reelected with the addition of one member, Paul Coddington of the Lakeside Bridge Co., Milwaukee. George W. Blakely of Bethlehem Steel Co. and C. Edwin Michael of the Virginia Bridge Co. were elected honorary members of the institute. The next place of meeting was left open for later decision.

Wheeling Plant To Vulcan Rail

VULCAN RAIL & CONSTRUCTION CO., Maspeth, N. Y., has purchased the Fabricated Steel Products Co., Wheeling, W. Va., manufacturers of welded pipe railings, and is operating its fabricating plant at Benwood, W. Va.

Incorporated in 1906, the Vulcan company specializes in pipe and bridge railings and wrought fencing. President of Vulcan is W. B. Cater, one of the concern's organizers. Announcement of the purchase, effective Oct. 1, came from Mr. Cater and W. B. Ewing, representing the Fabricated Steel Products Co.

The Fabricated company specialized in welded pipe railings using pipe throughout without fittings. One type is known as the Flush-Weld, where the railing is smooth with projections at the joints.

Columbia Steel Co., subsidiary of United States Steel Corp., utilized picture drawings in the form of "stick-men" to promote safety among its workers. Drawings showing position of the workmen with respect to the apparatus before, during and after an accident enable the employes to see at a glance what caused the accident, Earl Spitzer, Columbia Steel safety engineer, told the 26th National Safety Congress and Exposition in Kansas City, Mo.

Six thousand visitors saw the manufacturers' products exhibit held Oct. 19-21 at Baltimore under sponsorship of the Purchasing Agents' Association of Baltimore. Chief speaker was Merle Thorpe, editor of *Nation's Business*. Chairman of the exhibit, which included 108 booths, was Frank H. Carter, of Dietrich Brothers, Inc., Baltimore.

Grace Finds Steel Buying "Not So Bad" at 45 Per Cent Level

EUGENE G. GRACE, Bethlehem Steel Corp. president, told New York newsmen this week he found cause for cheer in the steel situation despite the current decline in sales, shipments and earnings.

Announcing a $1.50 dividend on common shares (Dec. 24 to stock of record Dec. 17), Mr. Grace promised another Bethlehem directors' board meeting for consideration of a late 1937 dividend and had the following to say of various phases of Bethlehem's business:

DEMAND.—New business is running at about 45 per cent of capacity. I consider that this volume of business against miscellaneous buying shows the situation is not so bad as people who base their judgment on securities prices have been thinking. There is no railroad steel buying power of any moment and automobile steel buying has not yet asserted itself.

PRICES.—We find no pressure on the present level of prices and no reports of dissatisfaction among our customers with prices. With the higher wages, taxes and other costs there can be no price decrease. The automobile manufacturers have based their higher prices for cars on present prices for steel.

LABOR.—There have been no important layoffs so far. The company's payroll peak reached 103,000 in the third quarter against 85,000 a year earlier. Bethlehem wage earners averaged 37.8 hr. per week in the third quarter, 39.4 hr. in the second, and 40.2 hr. in the first quarter of 1937. In the third quarter of last year the average hours worked weekly was 39.3 (fourth quarter, 40.3 hrs.). The payroll for the first nine months this year was $138,000,000 against $86,000,000 in the same period of 1936. Labor relations and working of the Employes Representation plan are satisfactory. We have no contracts with outside unions.

PROFITS.—I am unable to say whether the company would be in the black at 45 per cent in view of higher wages, taxes, etc. Future experience will, in the light of changing conditions, have to determine the pay point. The results of our October and November business will be available when the directors hold a special meeting early in December.

EXPANSION.—Expenditures for plant improvements in the first nine months this year totaled $35,000,000. Another $10,000,000 will be spent in the fourth quarter, leaving $4,000,000 appropriated but still to be expended.

EXPORTS.—Bethlehem's export business has increased but it is mostly commercial. The principal export is plates.

RAILROADS.—The recent freight rate advance will not bring any substantial improvement in demand for steel but the proposed general rate advance, if granted, will be felt at once.

Bethlehem's earnings statement this past week showed a net third quarter profit of $9,249,560 or $2.31 a share, compared with $2.56 for the second quarter of 1937 and $0.84 per share for the third period of 1936. Mr. Grace said:

"The estimated value of orders on hand Sept. 30, 1937, was $125,820,124, as compared with $147,-

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● Thomastrip has provided the quick solution to many a production problem. Its ideal adaptability to required purposes of drawing, stamping and forming, its fine commercial finishes in electro zinc, nickel, copper, brass or plain, its dependable uniformity and accuracy to specifications, insure economy and freedom from fabrication difficulties. Hundreds of manufacturers are profiting by the use of this specialized production cold rolled strip — benefiting by the engineering cooperation and service speed of the closely coordinated Thomas mill and Sales Departments. Without obligation, a Thomas engineer will gladly analyze your particular fabrication problem and determine the Thomastrip specification best for your product and equipment. Investigate, today, the many definite advantages available to you in Thomas specialized experience and service cooperation.

Send for test samples. Specify width, gauge, temper and finish desired.

THE THOMAS STEEL CO. WARREN, O.

Specialized Producers of Cold Rolled Strip Steel

216,591 at the end of the previous quarter and $93,272,198 on Sept. 30, 1936.

"Steel production (ingots and castings) averaged approximately 85.1 per cent of capacity during the third quarter of 1937 as compared with 92.9 per cent during the previous quarter and 69.5 per cent during the third quarter of 1936. Current (October) steel production is approximately 65 per cent of capacity."

...OBITUARY...

HARRY FROST STRATTON, formerly president, Electric Controller & Mfg. Co., Cleveland, died at Sea Island, Ga., Oct. 17. Before rising to the presidency he was employed by that company as an electrical engineer. He resigned about 10 years ago and since then had spent much of his time in travel.

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ELIHU R. LYMAN, president of the Massachusetts Gear & Tool Co., Woburn, Mass., died at his home in that city on Oct. 29. He was born at Belchertown, Mass., 56 years ago, was graduated from the Worcester Polytechnic Institute in 1902, and during the War served overseas as ordnance officer for the 92nd Division.

❖ ❖ ❖

HERBERT CHARLES BALLORD, for the past eight years branch manager of the Baltimore office of the Crucible Steel Co. of America, died in that city on Oct. 22, aged 58 years. He had been identified with the company for the past 30 years.

❖ ❖ ❖

ERNEST E. FINCH, vice-president and general manager of the Karl Kiefer Machine Tool Co., died at his residence in Terrace Park, Ohio, on Oct. 28, aged 62 years.

❖ ❖ ❖

CHARLES W. MAYER, retired manager of the Crucible Steel Co. plant in Indianapolis and a native of Cincinnati, was buried in Cincinnati following services in Indianapolis, on Oct. 26. Mr. Mayer, who was 84 years old, died in Indianapolis. He left Cincinnati in 1900.

❖ ❖ ❖

AUGUSTUS COOK, for 30 years chief engineer for the Detroit Stove Works until his retirement about 12 years ago, was buried Oct. 26 in Detroit. Mr. Cook was born in Lapeer, Mich., 90 years ago and had lived in Detroit 60 years, engaging in mechanical engineering practice. For many years he was an engineer with the Federal Government in charge of dredging operations on the Great Lakes.

❖ ❖ ❖

JOHN J. MORSE, 87 years old, was buried Oct. 27 at Adrian, Mich. He helped perfect the machinery used in fence manufacture and for many years he was associated with the Withington Wire Fence Co., one of the first wire fence companies organized in Michigan. For the last 30 years he was with the Willbee-Morse Concrete Co.

a good structure is an important part of an EFFICIENT CONVEYING or SCREENING SYSTEM . . .

The design of structures must include good construction practise and economical provision for the varying loads and features for efficient and convenient plant operation. It's the work of specialists. Robins therefore maintains a trained structural designing department, in addition to their regular engineers, that will gladly design your structure for you or work in consultation with your own engineers. Write today for further particulars.

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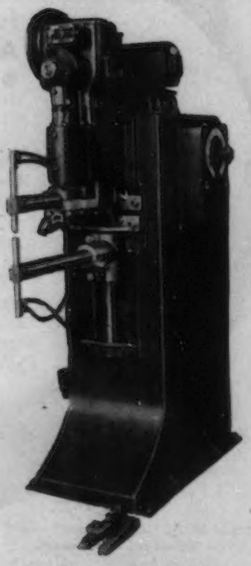


All working parts are enclosed in an oil tight housing.

Designed for high speed production.

Motor required 1/2 HP., 1800 RPM.

SWIFT ELECTRIC WELDER CO., 6560 EPWORTH BLVD., DETROIT
Welding machines hand, hydraulic, cam or air operated of the following types: spot, seam, projection, flash, butt, flue and pipe, and gun welding units.

Resistance Welding Widened by Tube Control—1

(CONTINUED FROM PAGE 33)

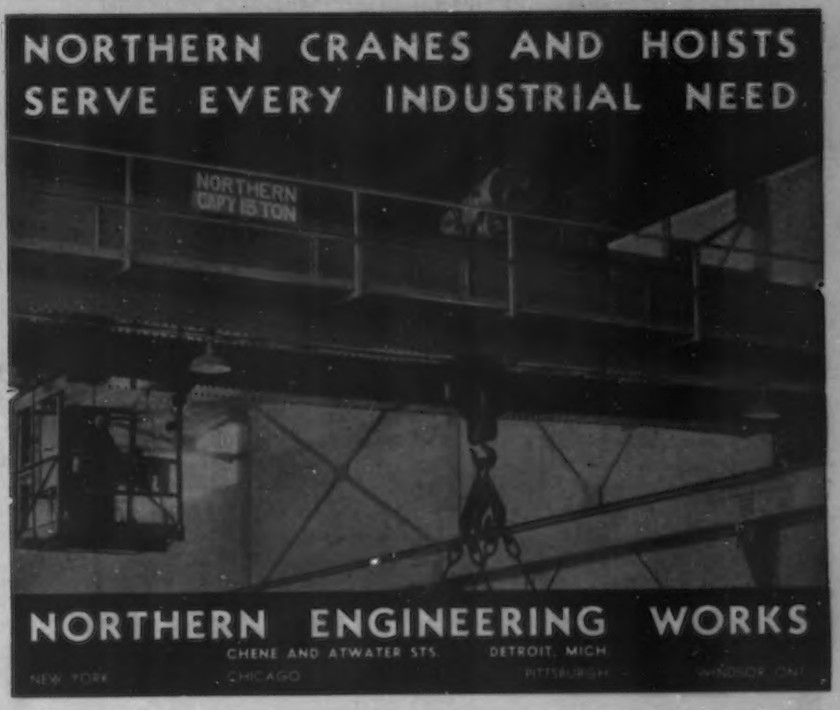
conducting. For welding control, the timing circuit supplies current to the igniter at the beginning of each half-cycle during which welding current is desired since the tube must be re-ignited for each half-cycle of power conduction. Since the tube is a rectifier, two are reverse-parallel connected in the a-c primary circuit of the welding machine transformer, one to carry the positive half-cycles and the other the negative half-cycles.

The ignitron spot welding circuit is shown schematically in Fig. 7. The weld timing portion of this circuit operates on the simple condenser discharge principle and is not affected by line voltage or load changes. One timing control tube is arranged to begin conducting at the exact predetermined point on the voltage wave where current passes through zero under steady state conditions. This "start" timing tube causes the power tubes to begin conducting without transient or "surge" current effects. Simultaneously a capacitor resistor circuit is energized. When the capacitor voltage reaches a critical value, a "stop" tube is energized and the power tubes stop conducting. Time of conduction in cycles is adjusted by varying the resistance in the capacitor timing circuit. This timing circuit operates to produce only one spot weld each time the control switch is closed and the timing circuit thereby energized.

For seam welding, a rapidly repeating type of timing control circuit is required which will operate to deliver interrupted current so long as the control circuit is closed.

Ignitron Seam Welding Timer

The ignitron power circuit for seam welding is the same as for spot welding as shown in the schematic circuit Fig. 7. However, the timer consists of a synchronously driven induction generator of unusual form which provides timing in place of the capacitor discharge circuit. The rotor is a disk containing 120 holes at the rim as shown in Fig. 6. This disk is driven at exactly one revolution per second by a synchronous motor. Each hole, therefore, passes a given point on the stator in a time corresponding to one-half cycle of current. It is now necessary only to plug steel pins into each hole for which welding current is desired. These pins pass between the narrow poles of the stator which is a permanent magnet on which coils are mounted serving to indirectly energize the ignitron power tubes at the passage of each pin through the magnet air gap. For example, four successive holes may be plugged and four left unplugged and so on around the disk when welding current will be delivered in 2 cycle pulses with 2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cycles interval between pulses. Thus, the timing and interrupting rates are both readily adjusted. This type of control is very desirable since the time adjustment is visual, accurate and simple.

(TO BE CONCLUDED)

Installs New Production Line for Detachable Instrument Sockets

(CONTINUED FROM PAGE 38)

terminal jaws to the terminal block. A four-spindle inverted screw driver is used for this. Successive operations are: The screws are dropped into the screw driver; the terminal block is dropped over the screws; the terminal connectors and jaws are assembled over the top of the screws, which extend through the block. Then the foot pedal of the screw driver is pressed to start the motor, tightening the screws. This assembly involves 18 separate pieces and is completed at the rate of 150 an hour. Finished terminal pieces are put on special trays, such as shown in the foreground of Fig. 5, and conveyed to the final assembly benches.

Sealing rings are completed in an adjacent section. The formed rings are brought to the line of benches pictured in Fig. 6, where the nuts are assembled to the brackets that were made on the U. S. Tool multi-slide machines and the nut is riveted to the ring on a Bliss No. 8 bench press. In a second operation the sealing nuts are assembled to the ring by means of a vertical nut setter. The rings in all stages of this processing are kept on pipe racks convenient to the hands of the assemblers. When filled, these racks, which are about 30 in. long, are taken off the bench and transported to the final assembly bench, located nearby.

Final Assembly

Final assembly of the plug-in sockets is shown in part in Fig. 7. From the 25-ft. high ferris-wheel type lacquer drying oven mentioned above the die-cast sockets proceed directly to a bench where the ground screw and connector are assembled. They then go by gravity roller conveyor to a bench where pieces of fish paper, previously blanked, are placed in the socket. Next, the terminal block and fish paper insulation are

placed in position and the entire unit is passed to an operator, who, by means of a special four-spindle motor-driven screw driver, assembles block and insulation to the base (see Fig. 7, operator at the right). At this point the assembled sockets are placed on storage racks, the shelves of which are rotatable for the convenience of the inspectors shown at the left in Fig. 7, who carefully check the block mounting screws for tightness.

The final operation before packing is the placing of the sealing ring around the completed socket, done by means of motor-driven horizontal screw drivers.

In addition to obvious advantages in the direction of flexibility, ease of application and minimum of investment in meters, the new plug-in instruments and accessories are lower in cost as compared with conventional switchboard instruments. And this is attributed to the use of standard watt-hour meter parts made on a large quantity basis by carefully engineered methods, such as outlined in part above.

Curtis Machinery Pact Ends Strike

CURTIS PNEUMATIC MACHINERY CO., a division of the Curtis Mfg. Co., St. Louis, announces a seven weeks' strike has been settled and its plant reopened following signing of a contract by the company and a committee of its employees. In April a majority of the employees in an election chose the CIO to represent them as bargaining agent but the contract was not signed with the union, L. C. Blake, Curtis official, said.

New Scrap Freight Rule Is Protested

A PROPOSAL by the Southwestern Freight Bureau to require scrap shippers to provide affidavits within 12 months of shipment certifying that the scrap had actually been remelted, before the scrap iron freight rates would be made applicable to each shipment, was protested at a hearing in St. Louis by representatives of the Institute of Scrap Iron and Steel. The proposal, according to Benjamin Schwartz, director general of the institute, would affect all scrap shipments for domestic and export purposes between Southwestern and Kansas-Missouri points.

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FABRICATING MACHINERY

PERSONALS

(CONTINUED FROM PAGE 69)

Engineers. Mr. Yarnall was born in Delaware County, Pa., in 1878 and was graduated with a bachelor of science degree from the University of Pennsylvania in 1905. He was associated with the Coatesville Boiler Works from 1902 to 1907 and with the Stokes & Smith Co., from 1907 to 1912. He was vice-president and general manager of the Nelson Valve Co., Philadelphia, from 1912 to 1918. In 1912 he organized the Yarnall-Waring Co., manufacturers of power plant specialties. He is a director and vice-president of the Pullenlite Co.

Mr. Yarnall is a director and chairman of the public affairs committee of the American Engineering Council and vice-chairman of the Engineering Foundation. From 1917 to 1920 he was manager of the A.S.M.E., and from 1929 to 1930 served as president of the Engineers Club of Philadelphia.

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WILLIAM P. WITHEROW, president, Blaw-Knox Co., Blawnox, Pa., has been appointed by the board of directors of the U. S. Chamber of Commerce to serve on the American Committee of the International Chamber of Commerce for the period 1937-1939. The American Committee, made up of officials from industrial, financial and commercial firms, is the governing and advisory body of the American section of the International Chamber of Commerce.

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DR. PAUL DYER MERICA, director of research of the International Nickel Co. and vice-president of the International Nickel Co. of Canada, has been awarded the 1938 John Fritz Gold Medal for "important contributions to the development of alloys for industrial uses." The award is made annually for notable scientific or industrial achievement by a board composed of representatives of the four national engineering societies of civil, mining and metallurgical, mechanical, and electrical engineers.

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R. A. CHAFFIN, of the Continental Steel Corp., Kokomo, Ind., has been elected general chairman of the metals section of the National Safety Council.

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W. H. NESBITT and W. C. SWICKERT have been made assistant vice-presidents of the Wheeling Corrugating Co., Wheeling, W. Va. Mr. Nesbitt has been sales manager of the company for a number of years and Mr. Swickert has been manager of the company's warehouse at Atlanta. E. C. Schaaf has been transferred from the Columbus warehouse, where he has been manager, to a similar post in Atlanta, and will be succeeded at Columbus by E. B. CARTER.

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H. H. BENFIELD, for the past seven years sales manager of the San Francisco district of Steel & Tubes, Inc., Cleveland, has been

H. H. BENFIELD

appointed conduit sales manager of the company, with office in Cleveland. Succeeding Mr. Benfield as district sales manager in San Francisco is A. V. GROVE, who has been identified with the firm for 12 years in operating and sales capacities. He is being transferred from the Chicago district.

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F. GLADDEN SEARLE has been made a member of the board of the Worthington Pump & Machinery Corp., Harrison, N. J.

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PAUL S. LANE, metallurgical engineer, American Hammered Piston Ring Division, Koppers Co., Pittsburgh, will discuss "Structure and Wear of Gray Cast Iron," on Nov. 12, before the Philadelphia chapter of the American Foundrymen's Association.

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WAYLAND S. BOWSER has been appointed to the staff of the vice-president in charge of office methods and procedures of Carnegie-Illinois Steel Corp., Pittsburgh. Mr. Bowser was formerly manager of the bureau of sales statistics. KEMP G. FULLER has been appointed manager, market research and sales statistics. Mr. Fuller was formerly manager of market research.

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LESLIE E. GEOHEGAN resigned last week as district manager of the Gulfsteel division of the Republic Steel Corp. The resignation took effect on Nov. 1. Mr. Geohegan had been connected with the Gadsden steel mills for 28 years and was vice-president and general manager of the Gulf States Steel Co. for many years previous to its sale to Republic Steel.

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GEORGE S. CASE, JR., last week assumed his duties as vice-president and general manager of the Lamson & Sessions Bolt Co., Birmingham. He succeeds H. P. LADDS, who resigned to become president of the Sweet's Steel Co., Williamsport, Pa.

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J. D. ARMOUR, chief metallurgist for the Union Drawn Steel Co., Massillon, Ohio, subsidiary of Republic Steel Corp., will address the Saginaw, Mich., chapter of the American Society for Metals on Nov. 16 on "The Free Machining Steels—Their Metallurgy and Machining Characteristics."

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JAMES Y. SCOTT, executive vice-president of the Van Norman Machine Tool Co., has been made a member of the executive committee of the Associated Industries of Massachusetts.

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CLARENCE E. BLEICHER has been appointed vice-president and general manager of the DeSoto division, Chrysler Corp., succeeding HERMAN L. WECKLER, who is now vice-president in charge of industrial relations. Mr. Bleicher has been for seven years one of the operating executives on the staff of President K. T. Keller. He has had charge of design and installation of all Chrysler production facilities and has coordinated engineering and production. He had extensive experience in the machine tool industry before becoming identified with automobile manufacturing, which started with the Maxwell Motor Car Co. in 1923. The preparation of the Maxwell Dayton plant to manufacture bodies for the original Chrysler 70 roadster and touring cars was in his hands.

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C. C. DORNBUSH has been appointed sales representative for the Dravo Corp., Pittsburgh, in its engineering works division. Mr. Dornbush until recently, was in charge of barge sales in the structural engineering sales division of Jones & Laughlin Steel Corp.

Steel Cartel Discusses Market, Exchange At Warsaw Gathering

LONDON (*Special Correspondence*).—The International Steel and Iron Cartel committee held its latest quarterly meeting in mid-October at Warsaw, Poland, in greatest secrecy.

However, the committee is understood to have discussed marketing conditions and conditions affecting international exchange with respect to sales of iron and steel products.

A conference on shipbuilding plates was held by the committee which also opened cartel negotiations with the Austrian Alpine works and the Hungarian Rimamurany works.

During the meeting, first held in Poland, and attended by 60 delegates from 11 countries, including France, Germany and the United Kingdom, the Warsaw Gazette charged that Poland had lost business by joining the cartel.

Recent steel industry developments in Europe and elsewhere are:

1—Sweden plans to increase iron ore output of its Grangesberg mines in Lapland and north Sweden by 2,000,000 tons annually for use of British and German plants. Last year 10,290,000 tons of ore, including 7,480,000 tons for Germany and 1,360,000 tons for the United Kingdom, were exported from Sweden.

2—British interests have bought Czechoslovakia's largest iron works, the Witkowitz mining and smelting works. Besides its iron interests the Czechoslovakian company owns eight coal mines. Recently a large block of its shares was transferred from the Viennesse banking firm of Gutmann Bros. to the Alliance Assurance Co., London.

3—The German steel trust, Dusseldorf, reported for the three months ended Sept. 30, pig iron output increased to 1,519,104 tons from 1,501,267 the preceding quarter, raw steel output to 1,611,261 tons from 1,606,597 and coke production to 2,141,885 tons from 2,105,597 tons.

4—Germany's steel industry objectives were outlined before 2,000 delegates recently attending the annual conference of the Association of German Iron Metallurgists as (a) discover new smelting processes for low-grade ores, (b) economize in use of foreign alloys, (c) reduce weight of steel constructions by welding and other means to make the same quantity of steel serve more consumers.

5—The Australian government has so far taken no action in response to demands for an embargo on iron ore exports to Japan.

6—The Australian government has granted a ten-year land lease to Australian Iron & Steel, Ltd., for workshops at Cockatoo Island, Yampi Sound, site of large iron deposits.

7—The state-owned South African Iron & Steel Industrial Corp., announced that manufacturing profits in the year ended June 30, 1937, were £669,279 compared with £435,665 in the preceding year while steel output in the 12 months ended June 30, 1937, totaled 233,723 tons against 205,079 tons in 1936 and 124,627 tons in 1925.

8—The Broken Hill Proprietary Co., Australia, announced it produced 669,532 tons of pig iron for the year to May 31, 1937, an increase of 62,083 tons, and 783,138 tons of ingots, a gain of 119,856 tons.

Pittsburgh Trade Index Shows Gain

THE Pittsburgh industrial production index last week (with 1923-1925 average as 100) was 19 points below the corresponding week last year, and after allowance for ordinary seasonal changes, was slightly below the preceding week. The district's trade index, also prepared by the University of Pittsburgh Bureau of Business Research, was ten points above last year.

Knudsen Warns Of Labor Wars

THE gulf now being fostered between capital and labor must not widen or the American standard of living will be lowered, William S. Knudsen, president, General Motors Corp., declared recently in an address at Boston.

An examination of the economics of both capital and labor will determine what labor's fair share of the proceeds of business shall be, Mr. Knudsen told guests at a dinner given by the Associated Industries of Massachusetts.

Urging that skilled workers be given the right to organize craft unions, the General Motors executive described the National Labor Relations Board and the Wagner Labor Act as one-sided.

"This is one of the dangers of the industrial unions as far as strikes are concerned," he said. "A strike binds everybody in the shop to take up the dispute of somebody they are not at all interested in, with the result that the union officials have to hastily dig up enough grievances for everybody in order to hold the strike together, regardless of whether conditions in nine-tenths of the plants are satisfactory."

Kettering Armco Dedication Speaker

MIDDLETOWN, Nov. 2.—Charles F. Kettering, vice-president in charge of research of General Motors Corp., will be the principal speaker and guest of honor at the dedication of the American Rolling Mill Co.'s new research laboratory building here Nov. 5. Mr. Kettering will speak on "Research, Industry and Progress" before 250 leading scientists, research men, editors, and scientific writers. George M. Verity, chairman of Armco's board of directors, and Charles R. Hook, Armco president, will also speak. Dr. Anson Hayes is Armco research director.

Morehead Medal to H. Sidney Smith

THE James Turner Morehead Medal for 1936 has been awarded to H. Sidney Smith, consulting engineer, Prest-O-Lite Co., Inc., New York, for his vision, inspirational guidance and aggressive cooperation in the advancement of the acetylene industry. The medal will be presented during the 38th annual convention of the International Acetylene Association, to be held at Birmingham, Nov. 10-12.

The Morehead Medal is awarded annually by the association to the person or persons who in the judgment of its officers and directors have done the most to advance the industry or the art of producing or utilizing calcium carbide or its derivatives.

Mr. Smith recently received the Samuel Wylie Miller Medal of the American Welding Society, as reported in THE IRON AGE of Oct. 14 and 28.

J. & L. To Build New Warehouse

CONSTRUCTION of a sulphate of ammonia warehouse and bagging plant at Memphis, Tenn., designed to store and handle 8000 tons of sulphate of ammonia and to meet the increased demand for this product, has been announced by Jones & Laughlin Steel Corp. The new warehouse will also provide the company with improved facilities for quicker deliveries and better service to cotton growers. Distribution of the fertilizer will be handled by Swift & Co. Fertilizer Works, New Orleans, and the Virginia-Carolina Chemical Corp., Richmond, Va.

Subsidiaries Of Blaw-Knox United

SUBSIDIARIES of Blaw-Knox Co. became known as divisions of Blaw-Knox Co., and the fabricating division located at Blawnox, Pa., became Blaw-Knox Division of the Blaw-Knox Co., effective Nov. 1, according to William P. Witherow, president of the parent company. Officers of former subsidiaries retain their respective status and duties.

Higher Fares To Yield $5,000,000

FARE increases approved by the Western Association of Railway Executives (approval by the Interstate Commerce Commission not required) will add $5,000,000 yearly to revenues of western carriers after March 1, Harry Guy Taylor, association chairman, announced. While special fares will change, the one-way first-class rate of 3c. a mile and one-way coach fare of 2c. a mile will remain unchanged.

Dodge Forecasts 1938 Building Dip

PRIVATELY financed building and engineering work next year should approximate this year's volume, with publicly financed work likely to continue its decline, according to Thomas S. Holden, vice-president of F. W. Dodge Corp., New York. The total volume of construction is likely to be moderately lower in 1937.

From 210,000 to 220,000 new family dwellings are likely to be built next year, compared with 185,000 to 195,000 in 1937 and 160,000 in 1936, while commercial building is likely to be little changed and fewer factories, public and institutional buildings will be erected, the Dodge Corp. forecasts.

During the first nine months of 1937 private construction in 37 Eastern states totaled $1,436,994,500, or 46 per cent ahead of the like 1936 period, while public building and engineering work dropped 18 per cent.

Next year, Mr. Holden said, will probably be neither one of serious recession nor of rapid recovery but a year of consolidating and stabilizing recovery gains.

Inland Steel Co. earnings for the quarter ended Sept. 30, 1937, after deductions for interest, depreciation, taxes and other charges, totaled $4,433,374, or $2.82 a share. For the 12 months ended Sept. 30, the company earned $16,741,929. A dividend of $1 payable Dec. 1 to stock of record Nov. 15 was declared on common stock.

Pittsburgh Coal Co. reported for the three months ended Sept. 30, 1937, a net loss of $413,492 compared with a net loss of $219,497 in the third quarter of 1936. Loss for the 12 months ended Sept. 30 was $790,070 against a loss of $1,768,515 in the preceding year.

National Steel Corp. reported for the quarter ended Sept. 30, 1937, a net income after all charges, except provision for federal surtax on undistributed profits, of $5,227,071, equal to $2.41 per common share, against a net income of $3,359,704, or $1.56 a share, in the third quarter of 1936. Nine months net profit this year was $7.81 per share compared with $3.96 during the same 1936 period.

Universal-Cyclops Steel Corp., Bridgeville, Pa., reported net income for the September quarter of $224,230 before surtax, equal to 45 cents a share. Net for the first nine months of 1937 was $901,134 before surtax, equal to $1.80 a share.

Pittsburgh Steel Co. reports for the September quarter of 1937, the first quarter of its fiscal year, net income of $257,160. Without giving effect to the recent recapitalization, net profit is equal, after normal dividend requirements on the 7 per cent perferred, in arrears, to 21 cents a share on 354,900 shares of common. In the September, 1936, quarter, net income was $309,244, or 35 cents a common share on the same basis.

Wheeling Steel Corp. for the September quarter reports net profit of $1,230,192, equal to $1.29 a share on the common against $1,186,660, or $1.59 a share in the third quarter of 1936. For nine months net profit was $5,002,033, equal to $6.18 a share on 576,189 common shares, against $2,068,859, or 91 cents a share on 387,744 common shares in the first nine months of 1936.

Republic Steel Corp. reports for the third quarter of 1937 a net profit of $3,237,155, after deduction of all charges, including estimated Federal income and surplus profits tax. Net profits for the first nine months of 1937 were $9,291,470 compared with a net profit of $6,333,649 in the like period of 1936. Provision for the estimated Federal income tax for the nine-month period was $3,600,000, including $1,350,000 for estimated surtax on undivided profits.

Allegheny Steel Co. reports for September quarter net profit of $271,579 before surtax, equal to 28c. per common share after preferred dividends, compared to $349,276, or 39c. per share in the September quarter of 1936. Net earnings for the nine months amounted to $1,604,514, or $1.90 per common share, against $1,297,045, or $1.50 per common share, in the first nine months of 1938.

Westinghouse Electric & Mfg. Co. reports for the nine months ended Sept. 30, 1937, net income of $16,726,520, equal to $6.25 per share on the combined common and preferred stock, compared with $11,123,706, or $4.18, in the 1936 period. Indicated net income for the September quarter was $5,394,748, or $2.02 per share, against $3,185,728, or $1.20 per share, in the corresponding period of 1936.

David Joseph Co., Cincinnati, dealer in old materials, has moved its office from The Times-Star Building to Cincinnati's newest skyscraper, the Carew Tower.

Terry Steam Turbine Co., Hartford, has announced the appointment of the following distributers: C. F. Cate, El Paso, Tex.; Darby Corp., Kansas City, Kan., and R. F. Riddle, 533 Mayo Building, Tulsa, Okla.

Standard Tube Co., Detroit, has moved its offices from 14520 Oakland Avenue, to 14534 Woodward Avenue, occupying part of the old Ford Highland Park plant.

Price Iron & Steel Co., Chicago, is moving on Nov. 15 into larger quarters in the Peoples Gas Building, Chicago.

Wailes Dove-Hermiston Corp., New York, announces through Julio F. Sorzano, industrial division manager, the following distributers of Bitumastic protective coatings for industry: Lytle Engineering Specialities, Ltd., Montreal, Canada; Marshall-Wells Co., Duluth, Minn.; A. Y. McDonald Mfg. Co., Kansas City and Joplin, Mo., and Hutchinson, Kan., and the Simmons Hardware Co., St. Louis, Mo.

Falender Iron & Metal Corp., Indianapolis, dealer in scrap metals, has moved its offices and yards to 615-699 South Capitol Avenue.

Union Bronze Co., Reading, Pa., is now located at 516-520 Tulpehocken Street.

Vacuum Cup Metal Pulley Co., Detroit, has moved to 12536 Grand River Avenue.

Pig Iron Output Drops Sharply; Oct. Daily Rate Down 17.9%

PRODUCTION of coke pig iron in October dropped to 2,892,629 gross tons from 3,410,371 in September. The loss in the daily rate amounted to 17.9 per cent, or from 113,679 in September to 93,311 in October. The daily rate last month was the lowest since September, 1936, which was 91,010 tons.

There was a net loss of 30 furnaces making iron on Nov. 1, the 151 operating at 83,850 tons daily, against 181 on Oct. 1, producing 110,260 tons daily. Thirty-two furnaces were blown out or banked and two furnaces were put in blast. The United States Steel Corp. took 15 furnaces off blast. Independent producers took 14 off blast and put two in operation, and merchant producers blew out or banked three units.

Among the furnaces blown out or banked were the following: Two Carrie, one Duquesne, two Edgar Thomson, one Ohio, one Mingo, two South Chicago (old), two South Chicago (new), and three Gary, of the Carnegie-Illinois Steel Corp.; one Central, American Steel & Wire Co.; one Harriet, Wickwire-Spencer Steel Co.; one Bethlehem and one Sparrows Point, Bethlehem Steel Co.; two Aliquippa and two Eliza, Jones & Laughlin Steel Corp.; one Midland, Pittsburgh Crucible Steel Co.; one Haselton and the United furnace, Republic Steel Corp.; one Campbell, one Hubbard and one Indiana Harbor furnace, Youngstown Sheet & Tube Co.; one Martins Ferry, Wheeling Steel Corp.; Hamilton No. 2, American Rolling Mill Co.; one Federal, Interlake Iron Co., and the Sharpsville furnace, Pittsburgh Coke & Iron Co.

The two furnaces put in blast were a Monessen unit, Pittsburgh Steel Co., and a Weirton Steel Co. furnace.

Daily Average Production of Coke Pig Iron

Gross Tons

	1937	1936	1935	1934	1933
January	103,597	65,351	47,656	39,201	18,348
February	107,115	62,886	57,448	45,131	19,798
March	111,596	65,816	57,098	52,243	17,484
April	113,055	80,125	55,449	57,561	20,787
May	114,104	85,432	55,713	65,900	28,621
June	103,584	86,208	51,570	64,338	42,166
½ year	108,876	74,331	54,138	54,134	24,536
July	112,866	83,686	49,041	39,510	57,821
August	116,317	87,475	56,816	34,012	59,142
September	113,679	91,010	59,216	29,935	50,742
October	93,311	96,512	63,820	30,679	43,754
November	.....	93,246	68,864	31,898	36,174
December	.....	100,485	67,950	33,149	33,131
Year	.....	83,658	67,556	43,592	26,199

Production of Coke Pig Iron and Ferromanganese

Gross Tons

	Pig Iron*		Ferromanganese†	
	1937	1936	1937	1936
January	3,211,500	2,025,885	23,060	24,766
February	2,999,218	1,823,706	24,228	24,988
March	3,459,473	2,040,311	27,757	22,725
April	3,391,665	2,403,683	26,765	19,667
May	3,537,231	2,648,401	34,632	18,363
June	3,107,506	2,586,240	34,415	17,549
½ year	19,706,593	13,528,226	170,857	128,058
July	3,498,858	2,594,268	23,913	20,205
August	3,605,818	2,711,721	29,596	20,658
September	3,410,371	2,730,293	26,100	15,919
October	2,892,629	2,991,887	26,348	19,805
November	.....	2,947,365	.....	24,368
December	.....	3,115,037	.....	25,715
Year	.....	30,618,797	.....	254,728

*These totals do not include charcoal pig iron.
†Included in pig iron figures.

Merchant Iron Made, Daily Rate

Tons

	1937	1936	1935	1934	1933
January	16,106	10,537	3,926	7,800	2,602
February	16,514	11,296	6,288	7,071	2,863
March	16,457	10,831	7,089	7,197	2,412
April	14,517	13,897	8,799	8,838	1,908
May	19,483	12,814	8,441	9,099	2,129
June	15,870	14,209	7,874	9,499	4,088
July	19,609	11,619	8,644	7,880	6,783
August	17,381	12,148	8,194	6,043	7,756
September	20,065	13,526	10,090	4,986	10,034
October	18,950	13,645	11,199	5,765	8,634
November	....	14,739	12,503	6,610	7,639
December	....	14,852	13,312	4,399	8,358

Production by Districts and Coke Furnaces in Blast

Furnaces	(Gross Tons) Production: October (31 Days)	(Gross Tons) Production: September (30 Days)	Nov. 1: Number in Blast	Nov. 1: Operating Rate, Tons a Day	Oct. 1: Number in Blast	Oct. 1: Operating Rate, Tons a Day
New York:						
Buffalo	240,215	239,055	11	7,245	12	7,970
Other New York and Mass.	39,276	38,768	3	1,265	3	1,290
Pennsylvania:						
Lehigh Valley	73,896	85,286	5	2,135	6	2,845
Schuylkill Valley	39,316	39,065	3	1,235	3	1,300
Susquehanna and Lebanon Valleys	30,705	34,861	2	990	2	1,160
Ferromanganese	.....	.....	0	.....	0	.....
Pittsburgh District	518,736	701,939	25	14,260	34	22,525
Ferro. and Spiegel	23,911	21,652	2	770	2	720
Shenango Valley	39,658	65,607	2	1,275	3	1,565
Western Pennsylvania	106,084	117,609	7	3,420	7	3,920
Ferro. and Spiegel	11,144	11,611	2	360	2	385
Maryland	127,432	135,865	4	3,920	5	4,530
Wheeling District	134,818	145,545	6	4,550	7	4,850
Ohio:						
Mahoning Valley	264,357	339,597	12	6,925	16	10,580
Central and Northern	284,166	292,486	14	8,170	16	9,750
Southern	42,373	57,675	4	1,180	5	1,925
Illinois and Indiana	527,334	696,363	21	13,590	30	22,555
Michigan and Minnesota	99,757	98,117	6	3,220	6	3,270
Colorado, Missouri and Utah	21,624	38,633	2	700	2	885
Ferromanganese	.....	.....	0	.....	0	.....
The South:						
Virginia	.....	.....	0	.....	0	.....
Ferromanganese	3,100	2,868	1	100	1	95
Kentucky	26,513	26,358	2	855	2	880
Alabama	238,214	221,411	17	7,685	17	7,260
Ferro. and Spiegel	.....	.....	0	.....	0	.....
Tennessee	.....	.....	0	.....	0	.....
Total	2,892,629	3,410,371	151	83,850	181	110,260

Basing Point Case To Open Tuesday

WASHINGTON, Nov. 2.—The Federal Trade Commission will begin hearings next Tuesday on its complaint against the Cement Institute and its members for alleged violation of the Federal Trade Commission Act and the Robinson-Patman Act through use of the multiple basing point system for quoting prices. The institute had asked that the hearing be postponed.

German Mill Output Holds

GERMAN rolling mill output in August totaled 1,265,337 metric tons against 1,269,705 in July and 1,255,007 in August, 1936, the United States Department of Commerce reported. August production included 390,681 tons of rods and small shapes, 128,290 tons of heavy plates and 104,361 tons of shapes.

Plea For New Rail Increase To Yield $495,500,000 Due Shortly

WASHINGTON, Nov. 2.—A flat horizontal increase of 15 per cent in freight rates, with few exceptions, and an advance in passenger rates will be asked for Class I railroads of the country in a petition which they expect to file with the Interstate Commerce Commission on Thursday or Friday of the present week.

Exceptions from the proposed 15 per cent freight rate increase, which would yield an estimated $495,500,000 annually, relate to bituminous coal and coke, anthracite coal, lumber, fruits and vegetables and sugar for which maximums will be set. The proposed 15 per cent increase in bituminous coal and coke and anthracite coal rates will be subject to a maximum of 15c. a net ton.

No Other Maximums

Aside from these particular exceptions, no maximums will be provided. The full 15 per cent will be asked on all other products, such as ore, scrap and manufactured iron and steel.

Moreover, it is proposed to superimpose the 15 per cent increase on increased rates granted Oct. 22. Under that decision the rates on iron and steel products were increased 10 per cent with a maximum of 1c. per 100 lb. This means that all iron and steel rates amounting to 10c. per 100 lb. or more will be uniformly increased 1c. per 100 lb. or 20c. per net ton, while on rates of less than 10c. per 100 lb. the increases will vary.

On Lake, Eastern and imported ore the increase was 6c. a gross ton, except that no increase was allowed on ore from Minnesota mines to upper docks. On Alabama ore the rate was increased from 40c. to 50c. per ton.

New Increase Costly

It is now proposed to add to these increases, as well as to increases in iron and steel rates, a horizontal boost of 15 per cent. No estimate of the cost of the 15 per cent increase to the iron and steel industry has been given out but the cost will be high. Increases granted on coke and bituminous coal by the Oct. 22 decision range from 3c. to 15c. per net ton. The railroads plan to put the increases granted Oct. 22 into effect on Nov. 10.

The commission has denied the railroad application to allow increased rates on 15 days' notice on so-called group two commodities on which no hearings were held but on which the carriers were left to file tariffs proposing increases by reason of the removal of outstanding orders which prevously had precluded the filing of such tariffs.

Hearings relating to this group may be held only to the extent individual tariffs are suspended. The group covers many important commodities and the prospective increases will represent a large revenue in addition to the higher yield from increased rate on the so-called basic commodities.

Would Yield $495,500,000

A third group covers commodities withdrawn from the general rate increase petition on which tariffs covering increases have been filed.

The proposed 15 per cent freight and passenger rate increase would yield $508,000,000 annually, of which $495,500,000 would arise from the freight rate increase.

The petition will ask that coach rates for passengers traveling on railroads in the Eastern district be increased from 2c., the present rate, to 2.5c. per mile.

No change is contemplated in Pullman or commutation rates. The Southern roads will increase all fares in coaches that are now on the basis of 1½c. to 2c. per mile; also round trip fares in coaches to basis of 2c. per mile.

The Western lines are increasing transcontinental coach fares between Chicago and Pacific Coast destinations $5 with adjustments between intermediate points. Increases will also be made in the round-trip-30-day coach fares and the round-trip intermediate class for tourist car fares.

Auto Shows Draw Considerable Interest

IF attendance at the various group and private showings of 1938 automobile models in New York means anything, the public is still new model conscious and is exhibiting sufficient interest in the new offerings to lead the car manufacturers to believe that the 1938 model season will be better than earlier expectations. Although the big show of the Automobile Manufacturers Association which opened on Oct. 27 at the Grand Central Palace had a disappointingly small attendance the first two days, by Monday attendance was only 12 per cent below the corresponding period last year. The Election Day holiday was expected to swell the figure for seven days equal to the first week last year, the opening of which occurred on a holiday, Armistice Day. Floor sales are said to be in satisfactory volume.

The private shows fared even better than the large exposition. General Motors' show at the Waldorf-Astoria drew crowds equal to those attending last year, and the per cent of floor sales was running higher. Many visitors were asking specific questions as to trade-in allowance, delivered price and monthly payments on "time," indicating that the interest was more than casual. Surprisingly enough, the higher priced lines appeared to be attracting more attention than those in the lower brackets. Chrysler's salon at the Chrysler building opened several days ahead of the main show at the Palace and attendance was averaging 5000 persons a day, considered satisfactory by the management. Ford's revamped display room at 1710 Broadway drew a continuous crowd of visitors and was the only place where the new Ford models could be seen.

Conversations with many persons in the industry revealed that many, prior to the show, looked upon the future with much uncertainty. The chief question in everyone's mind seemed to be just how adverse would the recent and drastic decline in the stock market be on public buying of cars. The results of the shows thus far, therefore, have been very encouraging, and some even believe that the 1938 model year may equal in volume the production of 1937, which amounted to 5,110,000 passenger cars and trucks. More conservative estimates put next year's production closer to 4,500,000 vehicles, which checks rather closely with the unofficial figures of reduced attendance at the Grand Central Palace, heretofore a fair barometer of public reaction and future sales. Official figures will be revealed after the close of the show on Nov. 3.

RAILROAD BUYING

State Railroads of Chile are inquiring for six locomotives.

RAILS AND TRACK SUPPLIES

State Railroads of Chile have ordered 17,000 tons of rails from Bethlehem Steel Co.

Output of Finished and Semi-Finished Steel In Third Quarter of 1937

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STEEL plants in the United States produced during the three months ended Sept. 30, 1937, a total output of 9,767,231 tons compared with production of 11,149,030 tons in the second quarter and 11,347,300 tons in the first quarter of this year. These figures, compiled by the American Iron and Steel Institute, appear in detail in the accompanying table.

M-100-9-37.

AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

Third Quarter - 1937

		Number of companies	Item	Annual Capacity Gross tons	Production for Sale—Gross Tons: Current Quarter: Total	Current Quarter: Per cent of capacity	Current Quarter: Shipments: Export	Current Quarter: Shipments: To members of the industry for conversion into further finished products	To Date (9 Months 1937): Total	To Date: Per Cent of capacity	To Date: Shipments: Export	To Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	31	1	xxxxxxx	1,180,076	xxx	138,805	635,599	3,275,101	xxx	242,641	1,976,765
	Heavy structural shapes	9	2	4,739,805	632,348	53.4	32,532	-	2,150,196	60.5	98,352	xxxxxxx
	Steel piling	4	3	264,800	32,826	49.6	3,400	-	88,855	44.7	5,881	xxxxxxx
	Plates—Sheared and Universal	22	4	6,335,219	914,361	57.7	158,748	4,041	2,607,248	54.9	295,751	19,597
	Skelp	7	5	xxxxxxx	148,676	xxx	25,404	74,992	545,335	xxx	68,550	308,680
	Rails—Standard (over 60 lbs.)	4	6	3,575,000	240,438	26.9	12,687	-	1,105,227	41.2	25,105	xxxxxxx
	Light (60 lbs. and under)	7	7	433,500	21,080	19.5	1,950	-	93,987	25.8	8,771	xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	140,000	5,405	15.4	827	-	36,435	34.7	6,164	xxxxxxx
	Splice bar and tie plates	15	9	1,472,193	80,763	21.9	1,601	-	420,995	38.1	4,688	xxxxxxx
	Bars—Merchant	41	10	xxxxxxx	925,972	xxx	30,464	95,955	3,243,978	xxx	74,089	374,310
	Concrete reinforcing	29	11	xxxxxxx	218,117	xxx	6,313	-	668,350	xxx	22,664	xxxxxxx
	Cold finished—Carbon	18	12	xxxxxxx	154,519	xxx	2,672	-	545,219	xxx	5,410	xxxxxxx
	Alloy—Hot rolled	16	13	xxxxxxx	200,721	xxx	4,002	13,445	590,548	xxx	9,147	45,873
	—Cold finished	13	14	xxxxxxx	27,848	xxx	317	-	72,063	xxx	977	xxxxxxx
	Hoops and baling bands	4	15	xxxxxxx	26,260	xxx	359	-	74,439	xxx	908	xxxxxxx
	TOTAL BARS	60	16	11,644,826	1,551,437	53.3	44,527	109,400	5,194,597	59.5	113,195	420,183
	Tool steel bars (rolled and forged)	17	17	106,092	10,698	40.3	28	-	37,698	47.4	118	xxxxxxx
	Pipe and tube—B. W.	16	18	1,810,472	161,985	35.8	7,500	-	852,624	48.1	24,098	xxxxxxx
	L. W.	11	19	1,469,099	165,907	45.2	8,484	-	574,349	52.1	21,729	xxxxxxx
	Electric weld	4	20	586,107	55,948	38.2	821	-	162,555	37.0	1,205	xxxxxxx
	Seamless	15	21	2,772,828	438,971	63.5	28,318	-	1,312,044	63.1	73,195	xxxxxxx
	Conduit	7	22	155,270	21,199	54.6	784	-	66,331	57.0	2,184	xxxxxxx
	Mechanical Tubing	5	23	188,800	30,305	64.2	1,910	-	99,586	70.3	4,673	xxxxxxx
	Wire rods	20	24	xxxxxxx	169,230	xxx	19,416	43,990	581,564	xxx	40,954	187,096
	Wire—Drawn	38	25	1,889,827	281,605	59.6	14,896	2,597	1,011,055	71.3	46,980	16,154
	Nails and staples	19	26	1,125,795	100,102	35.6	3,217	-	420,754	49.9	17,481	xxxxxxx
	Barbed wire and fence	17	27	1,181,008	75,417	25.5	9,567	-	330,154	37.3	29,525	xxxxxxx
	Bale ties	11	28	115,277	13,748	47.7	65	-	45,137	52.2	218	xxxxxxx
	All other wire products	5	29	31,000	1,211	15.6	-	-	5,321	22.9	1	xxxxxxx
	Fence posts	14	30	144,300	13,604	37.7	215	-	53,105	49.1	808	xxxxxxx
	Black plate	12	31	572,229	96,184	67.2	7,249	39,824	303,538	70.7	15,086	94,526
	Tin plate	14	32	2,961,812	687,756	92.9	81,973	-	1,941,726	87.4	269,083	xxxxxxx
	Sheets—Hot rolled	19	33	xxxxxxx	486,883	xxx	34,354	5,476	1,640,782	xxx	71,096	55,097
	Hot rolled annealed	21	34	xxxxxxx	449,926	xxx	21,405	295	1,542,855	xxx	62,155	1,311
	Galvanized	17	35	xxxxxxx	328,013	xxx	21,798	-	995,570	xxx	39,353	xxxxxxx
	Cold rolled	19	36	xxxxxxx	479,505	xxx	35,090	-	1,651,780	xxx	80,725	xxxxxxx
	All other	16	37	xxxxxxx	138,128	xxx	6,354	-	464,994	xxx	13,534	xxxxxxx
	TOTAL SHEETS	30	38	10,157,327	1,882,455	74.1	118,999	3,769	6,295,981	82.6	286,861	56,408
	Strip—Hot rolled	28	39	3,475,374	492,446	56.7	14,304	71,204	1,769,771	67.9	48,715	274,572
	Cold rolled	39	40	1,200,333	170,427	56.8	2,656	-	620,423	68.9	7,287	xxxxxxx
	Wheels (car, rolled steel)	5	41	380,319	37,360	39.3	156	-	143,599	50.3	1,758	xxxxxxx
	Axles	5	42	425,900	29,894	28.1	561	-	112,087	35.1	1,491	xxxxxxx
	Track spikes	11	43	308,458	21,994	28.5	381	-	83,906	36.3	1,047	xxxxxxx
	All other	5	44	27,907	1,381	19.8	11	-	5,655	27.0	111	xxxxxxx
	TOTAL STEEL PRODUCTS	149	45	xxxxxxx	9,767,231	xxx	741,792	985,216	32,134,917	xxx	1,757,704	3,335,881
	Estimated total steel finishing capacity based on a yield from ingots of 70.9 %	-	46	47,401,500	xxxxxxx	74.1	xxxxx	xxxxxxx	xxxxxxx	81.0	xxxxxxx	xxxxxxx
	Pig iron, ferro manganese and spiegel	29	47	xxxxxxx	1,702,614	xxx	92,726	465,207	5,014,522	xxx	244,884	1,427,415
	Ingot moulds	4	48	xxxxxxx	110,863	xxx	1,872	-	327,101	xxx	4,446	xxxxxxx
IRON PRODUCTS	Bars	13	49	257,019	11,359	19.2	29	246	50,162	28.2	160	794
	Pipe and tubes	4	50	185,457	9,705	20.9	299	-	42,206	30.3	660	xxxxxxx
	All other	4	51	113,660	1,988	7.0	342	375	14,046	16.5	1,985	1,364
	TOTAL IRON PRODUCTS (ITEMS 49 to 51)	16	52	476,176	23,052	19.3	670	621	106,414	29.7	2,805	2,158

Total steel products produced for sale, less shipments to members of the industry for conversion into further finished products: Current quarter 8,782,015 G.T.: 74.1% of Finishing Capacity.
To date 28,801,056 G.T.: 81.0% of Finishing Capacity.
The above tonnages represent 70.9 % of the ingots produced by companies whose products are included above.

Total companies included - 174

Utilities' Building Lag Blamed On New Deal's Punitive Policy

WASHINGTON, Nov. 2. — The Government's "punitive" policy toward the utility industry was cited Monday as largely responsible for the industry's lag in construction activities, estimated to require an expenditure of $2,600,000,000.

Utility executives, through their national committee in Washington, reported that "a series of Administration measures have so frightened capital that it has proved impossible to finance most of the needed construction." Figures included in the statement showed that the industry spent $752,000,000 annually for necessary construction from 1923 to 1932 but averaged only a little more than $238,000,000 each year during the last five despite the steadily increasing consumption of electricity.

The utility executives declared the accumulated construction deficit in their business represented an untapped reservoir of jobs rivaling the programs of WPA and PWA but that responsibility for this condition cannot be laid "on the doorstep of utility management."

"It has long been apparent," the committee said, "that the construction lethargy of the utilities has proved a drag on recovery especially in the durable goods industry. It is at least an imporant factor in the present industrial retreat from prosperity."

It was estimated that $450,000,000 (increase of $175,000,000 over 1936) will be spent by the industry during 1937 for construction work. The peak year came in 1930 when expenditures amounted to $919,417,000. The low point was in 1933 when $129,300,000 was spent.

Exports Lower in September; Scrap for Year at All-Time High

WASHINGTON, Nov. 2.—Exports of iron and steel products, excepting scrap, in September totaled 286,549 gross tons valued at $19,275,915, a decline of 29.7 per cent in quantity and 20 per cent in value from August exports.

Exports of scrap in September aggregated 256,191 tons valued at $4,815,993 in comparison with 478,296 tons valued at $9,305,239 in August. These sharp declines amounted to 46.4 per cent in quantity and 48.2 per cent in value.

In the third quarter of the current year exports of iron and steel products amounted to 1,155,993 tons valued at $69,880,468, the highest quarterly level since 1920 when quarterly exports average was 1,177,138 tons.

Pig iron continued in September to be the leading product exported, with a total of 64,945 tons.

More scrap was exported in the first nine months of the present year than has been exported in any similar period during the history of this trade. Shipments totaled 3,335,194 tons.

W. B. Todd Resigns From Jones & Laughlin

W. B. TODD has announced his resignation as a director and vice-president in charge of sales of the Jones & Laughlin Steel Corp., Pittsburgh. Mr. Todd has been with the company since 1922 and at that time resigned as vice-president of the Union Drawn Steel Co. to go with Jones & Laughlin as manager of the Cold Rolled Sales Division.

WILLIAM B. TODD

79,000 Tons of Steel For Grand Coulee Dam

WASHINGTON, Nov. 2.—The Bureau of Reclamation, Department of Interior, today announced that bids will be taken on Dec. 10 at Spokane, Wash., for contracts to complete the Grand Coulee Dam and power plant. Work included in the new contract will involve the placement of about 79,000 tons of steel as follows: 25,000 tons of reinforcement steel, 5,000 tons of pipe and fittings, 25,000 tons of gates and operating devices, 12,000 tons of trashrack metalwork, 8,000 tons of penstock metalwork and 4,000 tons of cranes and miscellaneous metalwork.

The bureau has not determined as yet when it will begin the purchase of steel requirements. The various tonnages will be purchased as required rather than in a single lot.

Machinery Exports Rise in September

UNITED STATES exports of machinery in September totaled $19,723,879, a gain of 50 per cent over last year's corresponding shipments of $13,083,340, with all eight major machinery groups sharing in the advance, the Machinery Division of the Department of Commerce announced. Power-driven metal-working machinery gained 19 per cent and power-generating machinery 158 per cent.

British Still Short of Scrap

LONDON *(Special Correspondence)*. — The scrap scarcity continues to be a source of great anxiety to British steel producers and a meeting has just been held in London to consider means for securing a further increase in supplies.

At this meeting, held under the auspices of the British Iron and Steel Federation, the whole question of supplies and prices was reviewed. The meeting was private and at the conclusion no official statement was issued for publication.

FABRICATED STEEL

. . . Lettings decline to 12,000 tons from 23,400 tons last week.

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. . . New projects lower at 6900 tons as against 32,500 tons in the previous week.

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. . . Plate awards call for 2515 tons.

STRUCTURAL AWARDS

NORTH ATLANTIC STATES

New York, 900 tons, city garage, 150th Avenue, to Dreier Structural Steel Co., N. Y.

Queens, N. Y., 1300 tons, enlargement of Willetts Point station, to Fort Pitt Bridge Works Co., Pittsburgh.

Glendale, N. Y., 320 tons, turbo-generator supports, Long Island Lighting Co., to Lehigh Structural Steel Co., Plainfield, N. J.

Greenburgh, N. Y., 285 tons, New York School for Deaf, to Ingalls Iron Works Co., Birmingham.

White Plains, N. Y., 110 tons, National Casket warehouse, to Grand Iron Works, New York.

Binghamton, N. Y., 105 tons, Sears Roebuck building, to Bethlehem Construction Co., Bethlehem, Pa.

Atlantic City, N. J., 150 tons, Coco-Cola Bottling Co. building, to Bethlehem Steel Co.

Bradford County, Pa., 150 tons, highway bridge, to Bethlehem Steel Co.

Philadelphia, 120 tons, Frankford Hospital, to American Fabricated Steel Co., Philadelphia.

Pittsburgh, 370 tons, power house, Pittsburgh & Lake Erie Railroad, to Bethlehem Steel Co.

Baltimore, 320 tons, State tobacco warehouse, to Dietrich Brothers, Baltimore.

Parkhead, Md., 350 tons, Licking Creek State bridge, to Bethlehem Steel Co.

SOUTH AND SOUTHWEST

Raleigh, N. C., 500 tons, State office building, to an unnamed fabricator.

New Orleans, 200 tons, two derrick boats, United States Engineers office, to St. Louis Shipbuilding & Steel Co., St. Louis.

Navarro County, Tex., 400 tons, bridge, to Austin Brothers, Dallas, Tex.

Farmington, N. M., 1000 tons, San Juan River State bridge, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

CENTRAL STATES

Detroit, 400 tons, plant addition, Michigan Steel Tube Products Co., to Austin Co., Cleveland.

Detroit, 500 tons, State highway bridges, to R. C. Mahon Co., Detroit.

White Pigeon, Mich., 165 tons, power plant, to Jarvis Engineering Works, Lansing, Mich.

Cincinnati, 325 tons, Kemper Lane viaduct, to American Bridge Co.

Ottawa, Ill., 100 tons, Libbey-Owens-Ford Glass Co., glass conveying racks, to Lackawanna Steel Construction Corp., Buffalo.

Clinton County, Ill., 758 tons, bridge, to Vincennes Bridge Co., Vincennes, Ind.

Rock Island, Ill., 111 tons, bridge, to Midland Structural Steel Co., Cicero, Ill.

Chicago, 267 tons, addition to Englewood High School, to Joseph T. Ryerson & Son, Inc.

Springfield, Ill., 1100 tons, International Harvester Co. building, to Gage Structural Steel Co., Chicago, incorrectly reported last week as 250 tons.

State of Nebraska, 149 tons, highway projects; 145 tons to St. Joseph Structural Steel Co., St. Joseph, Mo., 144 tons, to Fremont Foundry & Machine Co., Fremont, Neb.

WESTERN STATES

Montalvo, Cal., 225 tons, packing plant, to Consolidated Steel Corp., Los Angeles.

San Francisco, 100 tons, car ladders for Pacific Fruit Express Co., to an unnamed bidder.

Bonneville, Ore., 183 tons, switch structure, to Bethlehem Steel Co.

CANAL ZONE

Balboa, 1600 tons, dock, to Bethlehem Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Monroe, N. H., 300 tons, State bridge.

New York, 210 tons, Bellevue Hospital power plant alterations.

New York, 1060 tons, viaduct, East 135th Street-Lincoln Avenue in Bronx; Rusciano & Son Corp., low bidder on general contract.

Queens, N. Y., unstated tonnage, steel work and construction, schools Nos. 55 and 259. Bids until Nov. 9 by Board of Education.

Weehawken, N. J., 1835 tons, viaduct, New Jersey approach Lincoln Tunnel; Taylor-Fitcher Construction Co., New York, low bidder on contract MHT-24.

Lakehurst, N. J., 230 tons, State bridge over Central Railroad of N. J.; bids Nov. 15.

THE SOUTH

Birmingham, 404 tons, bridge.

CENTRAL STATES

Kalamazoo, Mich., tonnage unstated, State hospital; Knecht, McCarty & Thebaud, Grand Rapids, Mich., architects.

Traverse City, Mich., tonnage unstated, State hospital; Angel & Schene, Detroit, architects.

Pontiac, Mich., tonnage unstated, State hospital, Derrick & Gamber, Detroit, architects.

Coldwater, Mich., tonnage unstated, Michigan Children's Village; Stewart Kingscott Co., Kalamazoo, architect.

Lapeer, Mich., tonnage unstated, Michigan home and training school; Maul & Lenz, Detroit, architects.

Ypsilanti, Mich., tonnage unstated, State hospital; Albert Kahn, Detroit, architect.

Mount Pleasant, Mich., tonnage unstated, home and training school; William Christian Palmer, Detroit, architect.

Ionia, Mich., tonnage unstated, State hospital; B. C. Wetzel & Co., Detroit, architects.

Warren, Ohio, 150 tons, stacks, tanks and supports, Ohio Public Service Co.

Indianapolis, 225 tons, John Deere Plow Co., warehouse; bids in.

Streator, Ill., 500 tons, warehouse, Owens-Illinois Glass Co.

Chicago, 990 tons, Galileo School, Norwood Park; bids in.

Minneapolis, 500 tons, State bridge.

St. Charles, Mo., 550 tons, Missouri River bridge repairs.

Milwaukee, 400 tons, Pulaski High School; bids Dec. 1. Frank M. Harbach is business manager of school board.

Manitowoc, Wis., 560 tons, bridge.

WESTERN STATES

Garfield County, Colo., 190 tons, two bridges; bids opened.

Missoula, Mont., 228 tons, highway bridges; bids Nov. 5.

St. Regis, Mont., 450 tons, Clark River bridge, United States Bureau of Public Roads.

Everett, Wash., 1000 tons, bridge.

FABRICATED PLATES

AWARDS

Philadelphia, 760 tons, 24-in. pipe for city, to Youngstown Sheet & Tube Co.

Houston, Tex., 210 tons, three storage tanks for General American Tank Storage Terminal Co., to Wyatt Metal & Boiler Works, Dallas, Tex.

Bossier, La., 125 tons, tanks for Arkansas Fuel Oil Co., to Pittsburgh-Des Moines Steel Co.

San Francisco, 1000 tons, 60-in. steel pipe for discharge main, to Western Pipe & Steel Co., San Francisco.

Toppenish, Wash., 100 tons, storage tank and tower, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Mare Island, Cal., 117 tons, navy target rafts, to Central Iron & Steel Co., Harrisburg, Pa.

San Diego, Cal., 200 tons, elevated water tank, to Chicago Bridge & Iron Works.

SHEET PILING

AWARDS

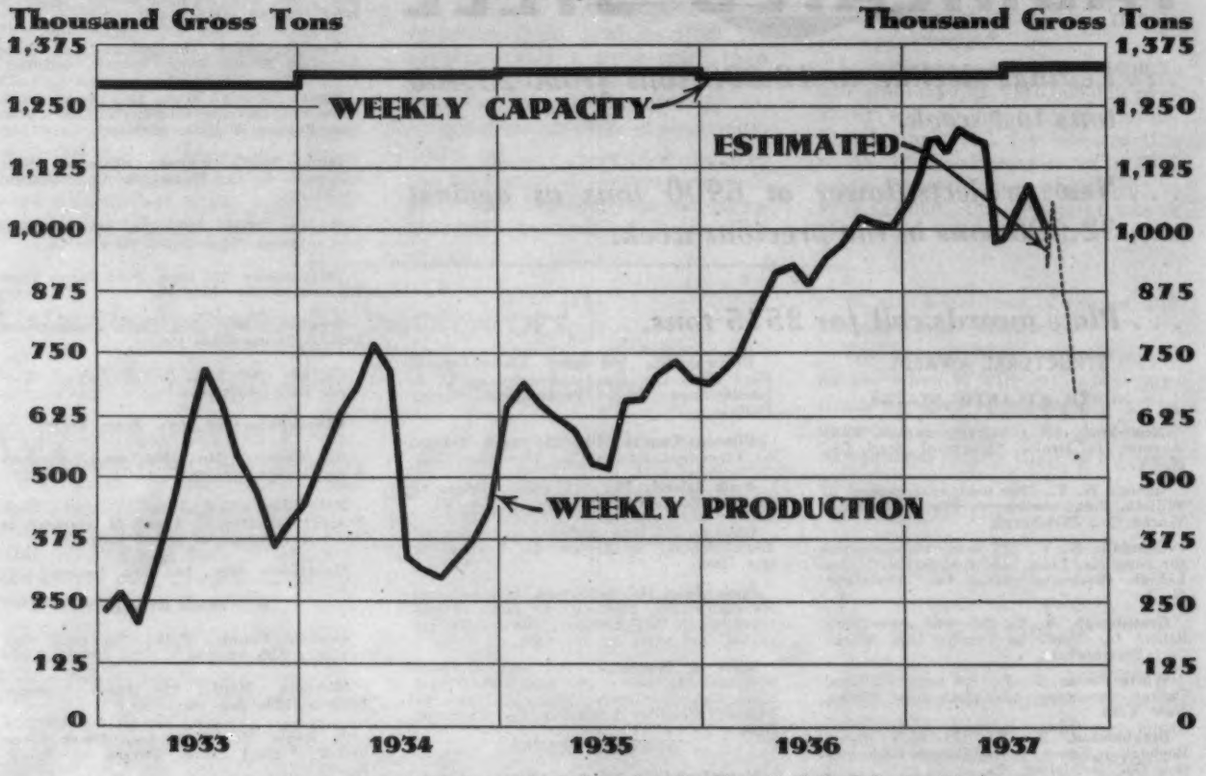
Los Angeles, 185 tons, for United States Engineer's Office, to Bethlehem Steel Co.

NEW PROJECTS

New Haven, Conn., 1700 tons, waterworks development. Project will also require reinforcing and structural steel, cast and wrought iron pipe and later several thousand feet of 24-in. steel pipe. George B. Gascoigne, Cleveland, is engineer.

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week
Pittsburgh	42.0	42.0
Chicago	42.0	44.0
Valleys	44.0	49.0
Philadelphia	50.0	52.0
Cleveland	54.0	60.0
Buffalo	34.5	52.5
Wheeling	72.0	76.0
Southern	49.0	55.0
Ohio River	55.0	48.0
Western	65.0	65.0
St. Louis	44.5	46.0
Detroit	85.0	90.0
Eastern	62.0	62.0
Aggregate	48.0	51.0

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Nov. 2, 1937	Oct. 26, 1937	Oct. 5, 1937	Nov. 2, 1936	1937	1936
Fabricated structural steel awards	12,000	23,400	7,900	15,850	915,285	894,830
Fabricated plate awards	2,515	1,870	1,620	1,110	93,870	202,275
Steel sheet piling awards	185	0	580	1,875	42,615	50,150
Reinforcing bar awards	6,375	2,700	4,400	2,625	262,000	294,515
Total Lettings of Construction Steel	21,075	27,970	14,500	21,460	1,313,770	1,441,770

. . . . SUMMARY OF THE WEEK. . . .

▲ ▲ ▲

. . . Pig iron output off 17.9% in October; 30 furnaces out.

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. . . Steel production again declines; now at 48% of capacity.

° ° °

. . . New business last month dropped 15 to 30%.

IN keeping with the precipitous decline in steel ingot production, pig iron output dropped sharply in October, from 113,679 tons a day in the previous month to 93,311 tons, a loss of 17.9 per cent, and the number of furnaces in blast was reduced from 181 on Oct. 1 to 151 on Nov. 1, this loss of 30 being the largest in one month since 1924, when 40 went out in April and 46 in May. The sharpest drop in the 1929 slump was in November, when 26 furnaces were blown out.

Pig iron production in October totaled 2,892,629 tons compared with 3,410,371 tons in September. Last month's daily rate was the lowest since September, 1936, when the figure was 91,010 tons. Of the net loss of 30 furnaces, 15 are owned by U. S. Steel subsidiaries, 12 by independent steel companies and three by merchant operators.

Foundry use of pig iron, which has been slower to recede than consumption by steel companies, is now declining as castings makers in some lines approach the end of their orders, and the effect is likely to be felt in a reduction over the remainder of the year in the number of active merchant furnaces.

STEEL ingot production has declined this week to 48 per cent of the country's capacity in a further adjustment to the small volume of new business. Of the major producing districts, only at Pittsburgh has the rate been maintained at last week's level of 42 per cent. The Chicago district has dropped two points to 42 per cent, the Wheeling-Weirton district four points to 72 per cent, the Cleveland-Lorain district six points to 54 per cent, the Youngstown area five points to 44 per cent. In the Buffalo district a sharp drop of 18 points to 34½ per cent was caused partly by the shutting down of the Republic plant this week for repairs. Only in one district, southern Ohio, has a rise in output occurred, from 48 per cent to 55 per cent, occasioned by the better operations of the leading producer in that district, brought about partly by increased automotive buying.

Curtailment of Lake Superior ore shipments because of lessened requirements will prevent the fulfillment of the expected water movement of 66,000,000 tons this year. Water shipments for the season up to Nov. 1 were 61,171,157 tons, but only about a million tons will be brought down this month. However, the movement will be by far the largest since 1929.

OCTOBER sales of steel were from 15 to 30 per cent below those of September, depending upon the company and the product, the chief declines being suffered by the heavy steels. It appears, however, that the drop in buying has been checked, but the chances of marked improvement have been lessened by the hand-to-mouth buying of the automobile companies, upon which much dependence has been placed for a business pickup. The outcome of the New York Automobile Show, results of which will be announced this week, is expected to have a pronounced effect on steel purchases of automobile companies from now on.

Railroad buying is at a rock-bottom minimum as the carriers prepare their case for a 15 per cent rate rise application and an increase in passenger fares. While some rail buying is expected this winter, it is believed now that important equipment purchases will be deferred pending a decision by the Interstate Commerce Commission on further rate increases, which probably will not be announced for at least three months. Meanwhile, export orders are aiding rail mills to some extent. The Ensley mill, idle since Aug. 27, has started rolling 13,000 tons of rails for the Manchurian Railways, and Bethlehem has booked 17,000 tons of rails for Chilean railways. Export buying generally does not bear out the promise of the large volume of inquiries that has been quoted on, the prices offered by foreign buyers in many instances being too low for ready acceptance here. Three American fabricators will share a Japanese order for tanks that will require 13,950 tons of plates.

Building construction volume is waning, many projects having been shelved because of uncertainty as to Administration policies toward business, as shown by the recent statement of public utility interests. The Bureau of Reclamation will take bids Dec. 10 on completion of the Grand Coulee Dam and power plant, which will require 79,000 tons of steel, including 25,000 tons of reinforcing bars. The battleship program will call for about 20,000 tons of steel, and an airport in California requires 10,000 tons of piling.

Steel scrap has dropped sharply in all markets. Business has shrunk to such small volume that some quotations are nominal. Heavy melting steel is down 50c. at Pittsburgh and Philadelphia and 25c. at Chicago. THE IRON AGE scrap composite has dropped to $14.42, a new low for the year and $7.50 below the year's peak.

. . . PITTSBURGH . . .

. . . Operations unchanged at Pittsburgh but lower in Wheeling-Weirton area.

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. . . October steel business down 25 to 30%, mainly in heavy steels.

o o o

. . . Production curtailment bringing more layoffs and shorter hours.

PITTSBURGH, Nov. 2.—The precipitous drop in steel ingot output has been checked, for the time being at least, in the Pittsburgh district and operations are unchanged this week at 42 per cent of capacity. Although some producers are working at lower schedules, the decline is offset by a higher rate at a large steel plant. Wheeling-Weirton district operations are off four points to 72 per cent. It is expected that ingot output will be irregular during the next several weeks.

Finished steel business continues spotty, with orders at some plants declining during the past week while other companies disclose an improvement. Taking the district as a whole, new business during the past six days undoubtedly shows a slight increase from the preceding two or three weeks. The improvement is the result of better wire and sheet specifications. While the automotive industry is the predominant buyer, there is some evidence that miscellaneous purchases are more diversified and slightly larger.

Sales of steel products during October were 25 to 30 per cent below the volume placed in September with the recession occurring chiefly in the heavy steels. Tin plate specifications are in lighter volume, with operations estimated at 65 to 70 per cent. Strip production is hardly better than 50 to 55 per cent, and most producers are badly in need of tonnages.

Raw material markets are exceptionally quiet. No. 1 heavy melting steel is off 50c. a ton, being quotable at $14.50 to $15.

Due to low operating rates at steel mills, layoffs and short time are on the ascendancy. Mills which hired additional people when the 40 hr. week was inaugurated are finding it necessary to lay off more workers than the companies which chose to pay overtime rather than increase the working force. Another factor in the present employment picture is the finishing up of construction programs at some mills, with the resultant dropping of construction workers.

Pig Iron

Aside from releases on commitments already made, current business continues dull. Most orders are for a carload or two for rounding out immediate needs. Stocks at customers' plants, however, are estimated to be at a low point. Any marked improvement in general business might quickly be reflected in a larger volume of pig iron orders. Foreign inquiry has picked up some in the past few weeks, with both England and Continental countries asking for quotations. Several inquiries now active average close to 10,000 tons each.

Semi-Finished Steel

October bookings of semi-finished steel were somewhat below the volume placed in September. Aggregate demand continues to decline and the past week's specifications were less than in the previous period. Consumers are evidently paring down inventories before making commitments.

Bars

Total hot rolled bar sales during October are about on a par with September bookings. Incoming specifications have been sluggish recently owing to extreme caution on the part of all buyers. The past week was no exception and orders show little change from the previous period. Meanwhile, it is thought that inventories in consumers' hands have been substantially depleted during the past few months. Ultimate consumption is undoubtedly greater than present bar production.

Cold Finished Bars

Total cold finished bar business during October was not much, if any, better than September bookings. Some automotive buying appeared but involved tonnage somewhat below expectations. Miscellaneous purchases have been slow and orders during the past week showed no improvement. Incoming business will hardly support 35 to 40 per cent of normal operations.

Reinforcing Bars

Both inquiries and awards are fair but do not approach large tonnages placed a month ago. Quite a few projects have been temporarily held up pending better business conditions from a financing standpoint. Specifications from jobbers during October were about on a par with September business.

Plates and Shapes

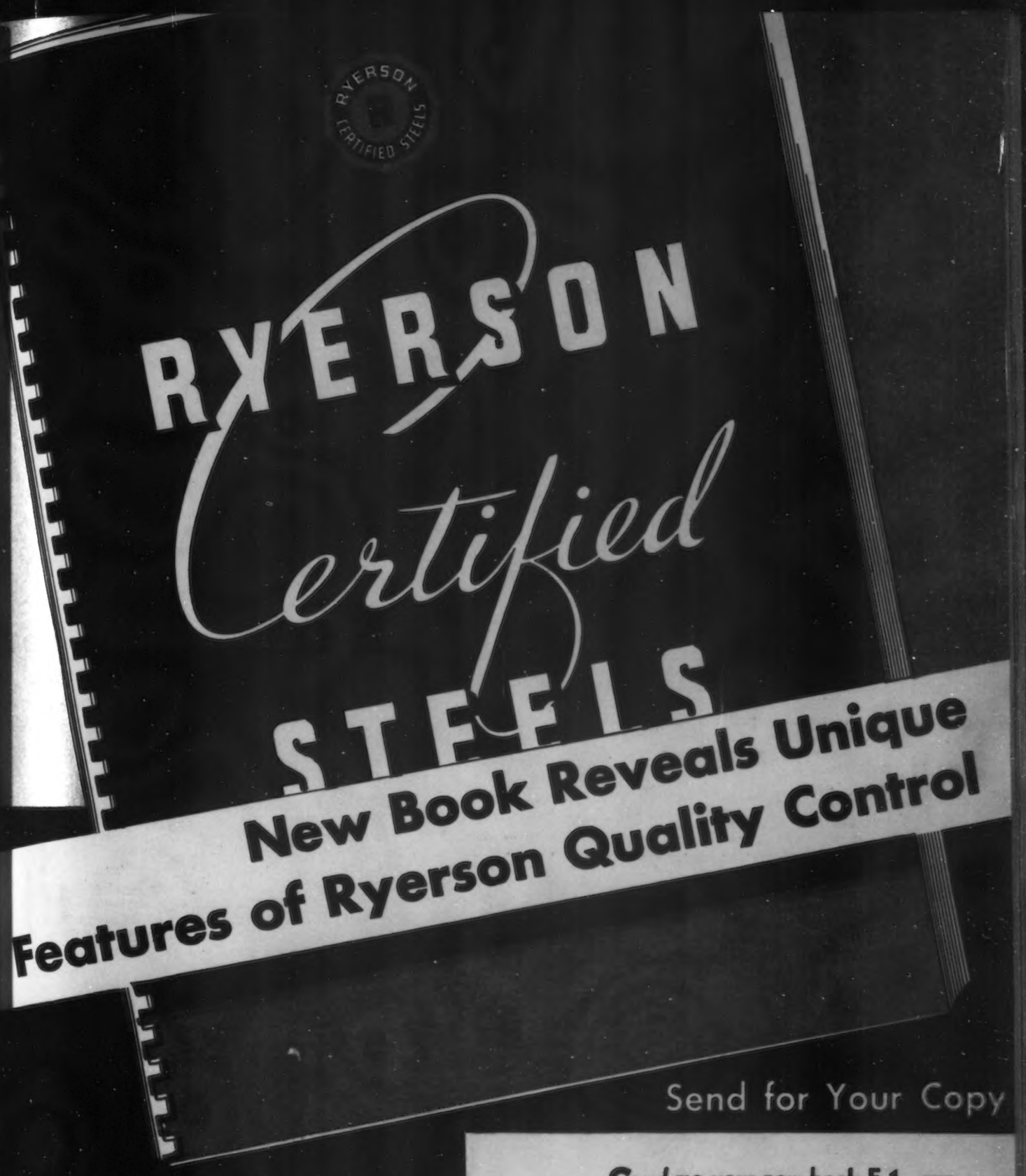
Structural plate and shape specifications during October are about 30 to 35 per cent below September bookings. New orders during the past week show little if any change from the previous period and are somewhat below the total bookings of a few months ago. American Bridge Co., Pittsburgh, has been awarded contract WB-5, Bronx-Whitestone Bridge, Queens, N. Y., involving 13,350 tons. Pittsburgh-Des Moines Steel Co., Pittsburgh, will furnish 1000 tons of fabricated material for a bridge at Farmington, N. M.

Tubular Products

Oil-country goods specifications have declined slightly from a week ago. With drilling operations curtailed, current specifications represent immediate requirements and it is expected that buying throughout the remainder of the year will be on a hand-to-mouth basis. Standard pipe demand continues exceptionally dull but railroad boiler tube specifications disclose a minor improvement.

Sheets

October business was about 8 to 10 per cent ahead of September bookings. A substantial improvement in sheet orders occurred during the past week and, although a large part of the increase was due to automotive buying, part of it re-



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A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Nov. 2, 1937	Oct. 26, 1937	Oct. 5, 1937	Nov. 2, 1936
Rails, heavy, at mill	$42.50	$42.50	$42.50	$36.37½
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, P'gh	37.00	37.00	37.00	32.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	32.00
Slabs, Pittsburgh	37.00	37.00	37.00	32.00
Forging billets, Pittsburgh	43.00	43.00	43.00	39.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	40.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	2.05
Bars, Chicago	2.50	2.50	2.50	2.10
Bars, Cleveland	2.50	2.50	2.50	2.10
Bars, New York	2.78	2.78	2.78	2.40
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.53	2.53	2.53	2.19
Structural shapes, P'gh	2.25	2.25	2.25	1.90
Structural shapes, Chicago	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5025	2.5025	2.5025	2.16¼
Cold-finished bars, P'gh	2.90	2.90	2.90	2.35
Hot-rolled strips, P'gh	2.40	2.40	2.40	1.95
Cold-rolled strips, P'gh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.60
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.20
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20, Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20, Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	2.05
Wire nails, Chicago dist. mill	2.80	2.80	2.80	2.10
Plain wire, Pittsburgh	2.90	2.90	2.90	2.50
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.55
Barbed wire, galv., P'gh	3.40	3.40	3.40	2.55
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.60
Tin plate, 100 lb. box, P'gh	$5.35	$5.35	$5.35	$5.25

Pig Iron

Per Gross Ton:	Nov. 2, 1937	Oct. 26, 1937	Oct. 5, 1937	Nov. 2, 1936
No. 2 fdy., Philadelphia	$25.76	$25.76	$25.76	$21.3132
No. 2, Valley furnace	24.00	24.00	24.00	19.50
No. 2, Southern Cin'ti	23.69	23.69	23.69	19.44
No. 2, Birmingham†	20.38	20.38	20.38	15.88
No. 2, foundry, Chicago*	24.00	24.00	24.00	19.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	20.8132
Basic, Valley furnace	23.50	23.50	23.50	19.00
Malleable, Chicago*	24.00	24.00	24.00	19.50
Malleable, Valley	24.00	24.00	24.00	19.50
L. S. charcoal, Chicago	30.04	30.04	30.04	25.7528
Ferromanganese, seab'd carlots	102.50	102.50	102.50	75.00

† This quotation is subject to a deduction of 33c. a ton for phosphorus content of 0.70 per cent or higher.
* The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$14.75	$15.25	$17.75	$17.50
Heavy melting steel, Phila.	14.75	15.25	17.25	15.75
Heavy melting steel, Ch'go	13.75	14.00	15.75	16.50
Carwheels, Chicago	16.00	16.50	17.25	16.50
Carwheels, Philadelphia	17.75	18.25	20.25	16.75
No. 1 cast, Pittsburgh	17.25	17.75	18.75	16.25
No. 1 cast, Philadelphia	17.75	18.25	20.25	16.75
No. 1 cast, Ch'go (net ton)	12.25	12.75	13.50	14.00
No. 1 RR. wrot., Phila.	17.75	18.25	20.25	15.75
No. 1 RR. wrot., Ch'go (net)	12.00	12.00	13.75	14.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.25	$4.25	$4.25	$3.75
Foundry coke, prompt	5.00	5.00	5.00	4.25

Metals

Per Lb. to Large Buyers:	Nov. 1, 1937			
	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	11.75	12.00	12.50	10.00
Lake copper, New York	12.125	13.125	13.125	10.12½
Tin (Straits), New York	47.75	48.50	55.75	45.87½
Zinc, East St. Louis	5.75	5.75	6.50	4.85
Zinc, New York	6.10	6.10	6.85	5.22½
Lead, St. Louis	5.35	5.35	5.85	4.65
Lead, New York	5.50	5.50	6.00	4.80
Antimony (Asiatic), N. Y.	17.25	18.25	18.25	12.50

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Nov 2, 1937	2.605c. a Lb.	$23.25 a Gross Ton	$14.42 a Gross Ton
One week ago	2.605c.	23.25	14.83
One month ago	2.605c.	23.25	16.91
One year ago	2.197c.	18.73	16.58

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	$21.92, Mar. 30	$14.42, Nov. 2
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.013c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

sulted from more active and greater miscellaneous purchases. Export business has also picked up some in the past few weeks.

Tin Plate

Specifications continue in lighter volume, with operations estimated at 65 to 70 per cent. It is expected that production will probably slip off further during the next few weeks.

Wire Products

Total wire sales during October were slightly below the volume placed in September, although a rising trend was noted during the latter part of last month. Incoming business during the past week improved with most of the increase being in the manufacturers' wire category. Aside from automotive buying, specifications from furniture, specialty and refrigerator shelf manufacturers materialized. Meanwhile, jobbers are still buying on a hand-to-mouth basis but tonnages placed are larger, due undoubtedly to the present merchant wire selling set-up.

Strip

Hot and cold rolled strip demand is no better than a week ago. Producers are still looking to auto parts makers to make up for the rather sharp falling off in orders. Wide strip is a little more active owing to automotive buying. Most strip makers are badly in need of tonnages.

Coal and Coke

Both coal and coke demand has declined in the past few weeks. In practically all cases consumers are depending as much as possible on inventories, despite the fact that prices may be higher later in the year. Owing to the fact that by-product coke production is more than adequate to take care of blast furnaces at steel plants, beehive coke production is at the lowest point in a year and a half.

. . . CINCINNATI . . .

. . . *Steel buying subsides after slight spurt.*

CINCINNATI, Nov. 2.—New business the past week was equal to about 50 per cent of mill capacity, down sharply from the preceding period. A moderate flurry of automotive ordering last week was not maintained the past week. General demand is also off. Business of the leading district interest was slightly above the general average. Mill operations are averaging about 50 per cent of capacity. Middletown, Butler and Ashland units of the leading interest are maintaining production at about this level while Zanesville is substantially higher. Other mills are running from 50 per cent down to about 35. Shipments have been fair.

Ingot production rose a few points to 50 per cent of capacity under increased activity of the leading district interest. Seventeen open hearths out of 34 in this area are in operation this week.

Pig iron business is lighter. No commitments of substantial nature are reported. Foundry operations are not changed and usual seasonal improvement in the stove and jobbing melt have not yet materialized. Machine tool foundries, however, are fairly active.

. . . BOSTON . . .

. . . *Not all New England points affected by higher pig iron freight rates.*

BOSTON, Nov. 2.—The increase in freight rates on pig iron, effective Nov. 10, amounts to 10 per cent of the existing rates, but not exceeding 20c. per gross ton. In New England this increase will apply on established rates from Everett, Mass., to destinations on the Boston & Albany and Boston & Maine railroads. To nearly all New Haven points, however, the increase will not apply as most existing rates were established to meet motor truck and water competition. The I.C.C. has ruled that such rates are exempt from any increase. Domestic iron continues to move in very small scattered lots, but several hundred tons of Indian iron have been sold. European countries are still taking small lots, recent sales including 500 tons for a Scandinavia port, and 50 tons for Rotterdam.

Foundries are holding the slight comeback made the preceding week. Operations at Bridgeport, Conn., Worcester, Mass., and Phillipsdale, R. I., steel mills have tapered off noticeably. The Phillipsdale mill is operating only one furnace.

. . GREAT BRITAIN . .

. . . *New business held up awaiting 1938 prices.*

LONDON, Nov. 2 (*By Cable*).—New business is virtually suspended as 1938 prices have not yet been announced. Makers are enjoying the respite and are working off old orders.

The pig iron shortage is less pronounced as merchants are using imported material, but still there is no Cleveland foundry iron available and none is made except at week ends. Heavy home demand for hematite is restricting exports. The ore position has been eased by cheaper freight rates, especially on the Mediterranean, but fuel is still scarce and expensive.

The supply of semi-finished steel is better and increased arrivals from the Continent are expected this month. The export steel market is quieter as home demand is less persistent, but works are busy for some months and many industrial programs are held up.

High prices on new shipping is holding up new ship orders.

The first blast furnace of the Richard Thomas new Ebbw Vale steel works was blown in.

Tin plate market is quiet as buyers are under the influence of general sentiment, but works are well placed this year and there is fair backing for the first quarter. Mill operation is about 75 per cent. Unfilled orders are just under 5,000,000 base boxes.

International Thin Sheet Cartel left the prices of black and galvanized sheets unchanged, but galvanized, No. 26 to 30 gage and thinner, has been reduced 10s. to 20s. for uncontrolled markets.

Continental iron and steel market is quiet, especially overseas export. Works are not yet affected as they are busy with current orders, but delivery delays are much shorter.

. . . . CHICAGO . . . .

. . . Ingot production declines again to 42% of capacity.

o o o

. . . Automotive releases increasing, but tonnage is not large.

o o o

. . . October steel sales below those of September.

CHICAGO, Nov. 2.—Steel ingot production is down again this week, losing two points to 42 per cent of capacity. Reductions were made at three mills, although at one where operations have been at capacity for several months, an open hearth was taken off only for repairs. The decline is less pronounced than at other times in the past month, but operators state that even the present low rates may not be maintained for long unless additional new business is received.

October sales ranged from 15 to 25 per cent below those recorded in September, and the consensus of opinion is that little important new business is to be expected for the remainder of this year, with the exception of whatever may develop in the way of automobile buying.

Releases from automobile makers are increasing steadily, but the volume of orders usually associated with that industry has not yet been seen. Sellers are much concerned over the public's response to the fall showings of new models. It is believed by some here that, even should motor car assemblies attain the heights predicted for this season, the present policy of purchasing for only a short time ahead will be continued.

Record speed is expected of the Interstate Commerce Commission's action on the petition presented last week by the railroads for a 15 per cent increase in freight rates, and a decision is expected within 90 days. Meanwhile sellers are looking forward to buying of rails and new equipment before the expiration of the three-months' period, possibly by the end of November. Old rail orders are about gone, and unless new business is obtained within a very short time, rail mills will be completely out of work. Rail activity may be influenced by a degree of overbuying last year by one or two roads, but the rail laying programs should not be affected.

Activity among the makers of farm tractors and implements continues at a high rate. Several plants are still idle for inventory purposes.

Scrap prices are 25c. to $1 lower this week, heavy melting steel being quoted at $13.50 to $14, down 25c. from last week.

Pig Iron

Shipments of pig iron in October ranged from about even to 14 per cent under those in September, while foundry coke shipments closed the month 2 per cent ahead of September after being as high as 15 per cent better earlier in the month. Automobile foundries are still not as active as was expected at this time, but some improvement in their operations has been noticed. With the inventory period among agricultural implement plants about completed, capacity operations are expected to be resumed. General jobbing foundries are somewhat less busy than last week and operations average 25 to 30 per cent less than a few months ago.

Wire and Wire Products

New business is unsatisfactory, and present inquiries do not indicate an upward trend in the near future. Rural buying has not yet made an appearance, although it is almost a certainty later in the month or early in December. Specifications from automobile manufacturers are being received, but not in substantial volume.

Sheets

For the past month deliveries of sheets have been practically unchanged, and the same schedules continue this week, two to three weeks for cold rolled and hot annealed, three weeks for enameling stock, and flat galvanized, and one to two weeks for hot rolled sheets. Motor car plants apparently had more stock on hand than was believed possible a few months ago, since production on most models is going ahead rapidly, and still sheet orders are not proportionately large. The reaction of the public to the fall motor car shows is expected to reveal a great deal to steel sellers as to what may be looked for in the way of further business from that industry during the fall and winter.

Plates

One mill is quoting delivery in one week on universal and sheared plates, which is sufficient testimony as to the amount of business being received. Practically nothing is coming from the railroads, although one seller is expecting some business possibly by the end of the month. It is believed that when the I.C.C. grants the rate increases now being sought considerable equipment buying will be seen, but action by the commission is not anticipated for 90 days at the earliest. Specifying of plates for tank building and other structural purposes is light.

Structural Shapes and Reinforcing Bars

The largest inquiry in some time is for 2200 tons of shapes and 500 tons of bars for the Pulaski School in Milwaukee, bids to be taken Dec. 1. The preponderance of bridge work on the current structural lists suggests depression days when private construction was negligible and public works, mostly bridges, were about the only projects worth mentioning. For the past month or so bridges have been the most frequently named project in the structural awards and inquiries. Reinforcing activity is lessening.

Bars

Here again the lack of sustained and heavy buying from the motor industry has caused a lull. Chief customers of bars today are the farm equipment manufacturers, forgers and some automobile parts suppliers.

Warehouse Business

October showed no rising tendency and was slightly under September. All items were equally in demand, however, and distribution was not concentrated on a few products. Jobbers are not anticipating a great deal for the remainder of the year since business usually begins to slacken about Nov. 15 because of the desire on the part of fabricators and other consumers to enter the new year with as small an inventory as possible.

. . . *No curtailment of steel or pig iron output.*

TORONTO, Nov. 2.—New business in the Canadian iron and steel markets showed moderate improvement in the past week. The automotive industry largely is credited with the change for the better, but there are other factors. Difficulty in financing new mining projects has almost brought to a standstill demand for steel and equipment from this source and many development programs have been suspended for the present.

There has been no curtailment in plant operations in Canada. Officials of Dominion Steel & Coal Corp. state that production of steel ingots by the Sydney, N. S., plant for the first nine months of this year increased approximately 16 per cent, or 43,000 tons, over last year with a total of approximately 314,000 tons. Other Canadian mills have shown corresponding improvement in production.

Merchant pig iron sales are holding up to the peak level for the year. Six blast furnaces are blowing as follows: Dominion Steel & Coal Corp., two; Steel Co. of Canada, two; Algoma Steel Corp., one, and Canadian Furnace Co., one. Prices are firm and unchanged.

Some of the interest has gone out of iron and steel scrap, but this is largely due to the fact that the mills have absorbed large tonnages of steel scrap from the railroads and are not pressing dealers for supplies.

. . . *Republic plant shut down this week for repairs.*

BUFFALO, Nov. 2.—Republic Steel Corp. yesterday shut down temporarily the five open-hearth furnaces it has been operating at its Buffalo plant. This was done owing to the necessity of making immediate repairs to the blooming mill. It is expected that steel production will be resumed next Sunday. The Bethlehem plant at Lackawanna dropped three open hearths over the week-end and is now running 13. Wickwire-Spencer has one on.

Foundries are running out of orders, which is bound to have an effect on pig iron shipments.

Couse & Saunders, Detroit contractors, attained the general contract for the main building of the Buffalo sewage disposal plant to involve 175 tons of structural steel and 400 to 500 tons of reinforcing bars. This building is the last unit of the general improvement, the original estimated cost of which was $15,000,000, but will run somewhat below estimates.

Warehouse business reflects general conditions, with plate and structural business considerably off and sheets slow. Specialties are about all that are holding up.

No figures on the steel to be required in the building of the score or more of western New York schools are available. Bids have not come in yet on the first job (Canaseraga) and will not be known till after Nov. 5. Reinforcing bar prices lack firmness.

. . . *Ensley Mill to roll 13,000 tons of rails for Manchuria.*

BIRMINGHAM, Nov. 2.—The Ensley rail mill of the Tennessee Coal, Iron & Railroad Co. will resume operations on Nov. 3. The mill has been idle since Aug. 27. Present plans call only for the production of 13,000 tons of rail and 900 tons of rail fastenings, booked from the Manchurian Railways. This will require from three to four weeks and further operations will then be dependent on additional business.

Steel production has declined further. Last week there were only 12 open hearths active. The Gulf-steel division of Republic Steel Corp. took off two units and is now operating three. The Tennessee company is unchanged, with three at Ensley and six at Fairfield. This week's schedules also call for 12 units.

The pig iron market is not very active, on account of previous bookings. The steel market has not yet responded to the usual fall demands.

Southern Steel Works, Birmingham, has booked 420 tons of structural steel for the new plant of the Fernandina Pulp & Paper Co., at Fernandina, Fla.

Hardie-Tynes Mfg. Co., Birmingham, has been awarded a contract by the Government for construction of two 168-in. butterfly valves for Boulder Dam power house, on a bid of $298,960.

Bay Pipe Line Co., Bay City, Mich., affiliated with Bay Refinery Co., same place, plans new welded steel pipe line from Buckeye Township oil field, Gladwin County, Mich., to Bay City, about 33 miles, for crude oil transmission to refinery at latter point. Pumping stations for booster service will be installed along route. Cost over $250,000. Howard D. Atha, Mount Pleasant, Mich., and James C. Graves, Saginaw, Mich., head affiliated companies noted, organized recently.

Cosmo Petroleum Corp., Jennings, La., has let contract to Williams Brothers Co., Houston, Tex., for welded steel pipe line from South Roanoke, La., oil field to South Jennings oil area, and thence to new bulk oil plant on Bayou Nezpique, near Jennings, for crude oil transmission.

Continental Oil Co., Ponca City, Okla., is completing surveys for new 6-in. welded steel pipe line from point near Eunice, La., to vicinity of Lake Charles, La., about 31 miles, for oil transmission. Pumping stations will be installed for booster service. Cost close to $250,000.

Corpus Christi, Tex., closes bids Nov. 10 for about 16 miles of 30-in. for main water line, with alternate bids on cast iron pipe. Fund of $650,000 has been arranged. Myers, Noyes & Forrest, Tower Petroleum Building, Dallas, Tex., are consulting engineers.

Public Utilities Commission, San Francisco, has low bid at $214,820.15 from Williams Bros. & Haas, Inc., Merchants Exchange Building, for 60-in. steel discharge pipe line for new Sunset reservoir, about 9570 ft., including lining and coating of pipe with single standard wrapping (Specifications W.D. 108); also low bid from Macco-Robertson, Ltd., Clearwater, Cal., at $213,620 for 36-in. steel pipe line in Palo Alto area, San Mateo and Santa Clara Counties, totaling 28,500 ft. (Specifications W.D. 156).

Board of Water Commissioners, Bellingham, Wash., asks bids until Nov. 12 on 419 tons of arc-welded steel pipe.

Hope Natural Gas Co., 545 William Penn Way, Pittsburgh, plans new 10-in. welded steel pipe line from Peoria, W. Va., to Bridgeport, near Clarksburg, W. Va., about seven miles, for natural gas transmission. It will replace an existing 6-in. line.

Sabinal, Tex., plans pipe lines for municipal butane gas distribution. A bond issue is being arranged.

United States Engineer Office, Navy Building, Washington, closes bids Nov. 5 for 10 lengths of 4½-in. steel pipe (Circular 44).

Toledo, Ore., closes bids Nov. 18 for 7000 ft. of 10-in. steel pipe for main water line from Siletz River, where new water source is being developed; also for pumping station and other waterworks installation. Beasley & Stoehr, Railway Exchange Building, Portland, are consulting engineers.

. . . CLEVELAND . . .

. . . Ingot rate drops further as orders fail to improve.

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. . . Decline in demand appears, however, to have been checked.

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. . . Automobile industry is buying on a hand-to-mouth basis.

CLEVELAND, Nov. 2.—A further drop in ingot output occurred this week, the Cleveland-Lorain district being down six points to 54 per cent of capacity and the Youngstown district declining five points to 44 per cent of capacity. Republic Steel Corp. yesterday blew out a furnace at its Corrigan-McKinney plant, Cleveland, for relining.

With backlogs being wiped out, finishing mill operations still show a downward trend. While business in finished steel is no better, the decline in the demand appears to have been checked. Consumption of steel by miscellaneous buyers evidently is far in excess of incoming shipments, indicating that their inventories are supplying the needs of most metalworking plants. Buying is of a hand-to-mouth character in small lots.

While sentiment in the steel industry is fairly optimistic, the end of the year is so near that not much revival in business is looked for during the current quarter.

Steel pipe probably furnishes the brightest spot in the steel industry at the present moment. Mills have good backlogs of all tubular products except merchant pipe and incoming business continues fair. Demand for all other finished steel products is very slow. Tin plate orders are being cleaned up and little new tonnage is coming out. Activity in the building field continues slack and little business is expected from the railroads during the remainder of the year. Steel purchases by motor car manufacturers continue light.

With shipments of 61,171,157 tons of Lake Superior ore up to Nov. 1, the water movement of ore is about finished for the season. Few cargoes will be dispatched after Nov. 15 and the movement this month is not expected to be much over 1,000,000 tons. While 1937 shipments will be more than 3,500,000 tons less than the 66,000,000 tons predicted earlier in the summer, they will be far ahead of those of any year since 1929.

Pig Iron

Contrary to expectations early in the month, shipments during October fell off about 10 per cent as compared with September. While foundry coke shipments declined sharply late in the month, some producers shipped more coke in October than in September. New pig iron orders are extremely scarce. The advance in freight rates is expected to cause a temporary increase in sales during the next few days. Shipments are fairly good to motor car, agricultural implement and equipment manufacturers. Some consumers are urging furnaces to name first quarter prices and some expect to announce shortly, possibly this week, the reestablishment of present prices. Increased freight rates, it is estimated, will increase the cost of making pig iron from 25c. to 50c. a ton, the increase being largely for interior furnaces and also depending on whether the ore supply comes from Minnesota or Michigan mines. Some merchant furnaces that have been building up substantial stock piles are likely to be banked shortly.

Bars, Plates and Shapes

Demand for hot rolled bars continues light. Business is scarce from the motor car industry and agricultural implement manufacturers are delaying the placing of orders for steel for their new production schedules. Activity in the construction field continues very light and little new work is in prospect. In some cases prospective work has been held up after inquiries were sent out. Fabricators need business and reports of concessions on fabricating prices are current. Cleveland is expected shortly to have an inquiry out for two water main extensions requiring about 2000 tons of fabricated steel pipe.

Iron Ore

Shipments of Lake Superior ore during October amounted to 6,562,035 tons and for the season until Nov. 1 were 61,174,157 tons. With the sharp curtailment in the demand for ore the shipping season is rapidly drawing to a close and the November movement will be very light. Total water shipments for the season are not expected to be over 62,500,000 tons. October shipments were 739,249 tons or 10.12 per cent less than in October last year. The movement until Nov. 1 was 20,110,285 tons or 48.97 per cent greater than during the corresponding period last year.

Bolts and Nuts

Shipments and sales during October were about 10 per cent less than during September. New demand is rather light. Jobbers are said to have good stocks, although some carload orders are coming from that source.

Sheets and Strip

Demand for these products continues to lag, with little, if any, change in volume of business. Quite a few orders are coming from motor car manufacturers, but these are for small lots. Faced with uncertainties regarding automobile sales by distributers, manufacturers are following a conservative attitude in purchasing steel. Some of the parts manufacturers have built up large stocks and are withholding releases against orders recently placed for strip steel. Little sheet tonnage is coming from miscellaneous consumers who evidently still have plenty of steel in stock.

Concrete Bar Group Adds New Members

DIRECTORS of the Concrete Reinforcing Steel Institute have elected to membership Carnegie-Illinois Steel Corp., Bethlehem Steel Co., Inland Steel Co., Carroll-McCreary Co., Inc., Brooklyn; Connors Steel Co., Birmingham; Olney J. Dean Steel Co., Chicago; Sheffield Steel Corp., Kansas City, and Tennessee Coal, Iron & Railroad Co.

REINFORCING STEEL

. . . Awards of 6375 tons —5425 tons in new projects.

AWARDS

New York, 125 tons, main bridge and viaduct approach, Bronx-Whitestone bridge, to American Bridge Co.

Brooklyn, 155 tons, Manual Training High School, to Bethlehem Steel Co.

Chautauqua County, N. Y., 150 tons, grade crossing elimination, to Bethlehem Steel Co.

Waymort, Pa., 100 tons, joists and bars for hospital, to Bethlehem Steel Co.

Bradford County, Pa., 100 tons, bridge, to Bethlehem Steel Co.

Selinsgrove, Pa., 350 tons, hospital, to Bethlehem Steel Co. through John McShane, general contractor.

Cincinnati, 100 tons, vegetable shed, Louisville & Nashville Railroad, to Jones & Laughlin Steel Corp., Pittsburgh.

Cincinnati, 200 tons, paving deck and approaches, Eggleston Avenue viaduct, to West Virginia Rail Co., Huntington, W. Va.

Beaver Dam, Wis., 146 tons, St. Joseph Hospital, to Bethlehem Steel Co.

Milwaukee, 400 tons, Pabst elevator, to Inland Steel Co.

Milwaukee, 262 tons, Kurth Malting Co. building, to W. H. Pipkorn Co., Milwaukee.

Sioux Falls, S. D.; 200 tons, John Morrell & Co. building, to Paper & Calmenson Co., Minneapolis.

Evanston, Ill., 160 tons, post office, to Bethlehem Steel Co.

Wickliffe, Ky., 1000 tons, highway bridge, to Knoxville Iron Co.

St. Louis, 350 tons, Marine Hospital, to Sheffield Steel Corp., Kansas City.

St. Louis, 600 tons, Psychopathic Hospital, to Laclede Steel Co.

Parco, Wyo., 157 tons, Kendrick-Seminoe project, to Inland Steel Co.

San Francisco, 390 tons, sewage disposal plant, to an unnamed bidder.

Los Angeles, 140 tons, outlet works for San Gabriel dam, to Consolidated Steel Corp., Los Angeles.

Sacramento, Cal., 197 tons, army air depot, to Bethlehem Steel Co.

Calexico, Cal., 198 tons, All-American Canal, to Bethlehem Steel Co.

Earp, Cal., 156 tons, Parker dam, to Bethlehem Steel Co.

Cantu, Cal., 246 tons, All-American Canal; 125 tons to Bethlehem Steel Co., 121 tons to Northwestern Steel Co.

Potholes, Cal., 115 tons, Gila project, to Sheffield Steel Co.

Knob, Cal., 175 tons, All-American Canal, to Northwestern Steel Co.

Panama, 200 tons for War Department, Canal Zone, to W. Ames & Co., Jersey City.

NEW REINFORCING BAR PROJECTS

Boston, 500 tons, Huntington Avenue bus way.

New York, 275 tons, viaduct, East 135th Street-Lincoln Avenue in Bronx; Rusciano & Son Corp., low bidder on general contract.

Queens, N. Y., 1750 tons, sewers; Elmhurst Contracting Co., Inc., low bidder.

Weehawken, N. J., 1125 tons, viaduct, N. J. approach, Lincoln Tunnel; Fairier & McLane Corp., low bidder on contract MHT-24.

Neville Island, Pa., 350 tons, Kelsey-Hayes Wheel Co.

Bryn Mawr, Pa., 100 tons, Bryn Mawr College dormitory.

Kalamazoo, Mich., 100 tons, Western State Teachers College.

Ballard County, Ky., 700 tons, State highway bridge; Albert Lyons, Rogersville, Tenn., contractor.

Milwaukee, 175 tons, Pulaski High School; bids Dec. 1. Frank M. Harbach is business manager of school board.

Chicago, 700 tons, Calumet sewer.

Sutter County, Cal., 563 tons, by-pass; Frederickson & Watson, Oakland, Cal., general contractors.

San Luis Obispo County, Cal., 207 tons deformed bars, overpass for state; bids opened.

..CAST IRON PIPE..

Middlebury, Vt., has awarded 100 tons of pipe to United States Pipe & Foundry Co.

Pineville, N. C., plans pipe lines for water system and other waterworks installation. Cost about $30,000. J. B. McCrary Co., Inc., Independence Building, Charlotte, N. C., is consulting engineer.

Ashford, Ala., will take bids soon for pipe for water system and other waterworks installation. Cost about $23,000. John M. Gilfillan, Lyric Building, Birmingham, is consulting engineer.

Mentor, Ohio, plans pipe lines for water system and other waterworks installation. Bond issue of $155,000 is being arranged. P. W. Elwell is city manager in charge.

Murdock, Minn., plans pipe lines for water system; also elevated steel tank and tower and other waterworks installation. Fund of $27,000 has been arranged. Ealy G. Briggs, 1955 University Avenue, St. Paul, Minn., is consulting engineer.

Fond du Lac, Wis., has placed 10,000 ft. of 4 to 8-in. pipe and 10 tons of fittings with James B. Clow & Sons Co., Chicago, at $12,444.13.

Trempealeau, Wis., has engaged Robert Cramer & Sons, consulting engineers, 647 West Virginia Street, Milwaukee, to design waterworks system costing $40,000 as PWA project. Byron Stephan is city clerk.

Racine, Wis., plans pipe lines for water system in Mound Cemetery district. Fund of $21,150 is being arranged through Federal aid. Henry A. Nelson is commissioner of public works in charge.

Plymouth, Ill., closes bids Nov. 12 for pipe for water system and other waterworks installation. Kinsey Engineering Co., 515 Court Street, Pekin, Ill., is consulting engineer.

Mountain View, Mo., will ask bids Nov. 8 for a waterworks system to cost about $51,500, toward which a PWA grant of $23,727 has been allotted. Beard Engineering Co., Maplewood, Mo., is engineer.

Board of Water Commissioners, Oklahoma City, plans pipe lines for extensions and replacements in water system. Fund of $1,250,000 is being arranged to carry out work over a 24 months' period. Special election has been called Dec. 7 to vote bonds in amount noted. C. E. Bretz and V. V. Long & Co., Colcord Building, are consulting engineers.

Sonora, Tex., will take bids soon for 6 and 8-in. for water system; also for 1½ or 2-in. galvanized steel pipe to replace smaller steel pipe lines, 100,000-gal. concrete reservoir and other waterworks installation. H. R. F. Helland, Frost National Bank Building, San Antonio, Tex., is consulting engineer.

Cleveland, Tex., plans pipe lines for water system and other waterworks installation. Fund of $120,000 is being arranged for this and sewerage system. Garrett Engineering Co., Houston, Tex., is consulting engineer.

Woodston, Kan., closes bids Nov. 5 for pipe for water system; also for 50,000-gal. elevated steel tank and tower, and other waterworks installation. Cost about $23,000. Paul B. Hughes, Norton, Kan., is consulting engineer.

Powell Valley Water District, Portland, Ore., has opened bids on 412 tons of 2 to 8-in.

East Bay Municipal Utility District, Oakland, Cal., asks bids until Nov. 10 on 715 tons as follows: 30,000 lin. ft. of 6-in., 15,000 lin. ft. of 8-in.

J. & L. To Dismantle Some Shape Mills

JONES & LAUGHLIN STEEL CORP., Pittsburgh, has, according to a company announcement, temporarily suspended the manufacture of certain structural and piling sections until such time as this tonnage can be allocated to more modern mills. At the same time it was indicated by the company that Nos. 12 and 14 structural mills located at the Pittsburgh works will be completely dismantled in the near future.

The structural and steel sheet piling sales departments have been consolidated with the hot rolled sales division.

Structural sections, the manufacture of which has not been discontinued but which were previously rolled on Nos. 12 and 14 mills, will be allocated to other mills in the company. The majority of these sections will be scheduled for rolling on the company's 14-in. mill at the Aliquippa works.

The scrapping of the two large structural mills and some other smaller units will provide valuable space for future expansion. In view of the company's current revision of steel making capacity, it is expected that new construction is in the picture for the future.

The company's announcement points out the fact that it still manufactures a considerable number of structural sections including plates and junior beams, and that the present suspension on some shapes is to be considered as a temporary measure.

. . . . NEW YORK. . . .

. . . No improvement in steel buying; users still well supplied.

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. . . October business less in some instances than that of September.

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. . . Export inquiries numerous but orders are slow to develop.

NEW YORK, Nov. 2.—The volume of new steel business has dropped to such a low point that the receipt of a few fairly good orders in one week sometimes gives false hopes that a turn for the better is actually appearing. Looking back over the past three or four weeks, however, sales managers find that orders have been approximately at a dead level. Bookings during the last two weeks of October were very poor and the month as a whole was no better, and in some instances worse, than September. With the inventory period closer at hand, sales offices do not look for much improvement over the next few weeks.

Consumers of steel seem to be pretty well supplied in view of the fact that their consumption has been decreasing. Some of the smaller jobbers, who were not financially able to build up large inventories, are coming back into the market for fill-in lots, but the larger jobbers still have substantial stocks. On certain sizes, however, even the larger warehouses are running short.

Export business has not developed in as large a volume as expected because of the unwillingness of most of the American mills to meet foreign ideas as to prices. A good deal of inquiry is being cabled over, but a surprisingly small part of it has thus far been translated into orders.

Pig Iron

In the absence of any change in the cautious buying activities of foundries in this district, the rate of shipments against old contracts continues to be the bulwark of the market. Freight advances which are soon to go into effect will amount to a maximum of 20c. per ton and are apparently not considered by buyers as sufficient reason to hasten deliveries to avoid the increase. House heating foundries are approaching the end of the busy season and are curtailing operations sharply, thus adding to the generally declining rate of foundry activity. Little improvement is expected before next spring. A few small orders for export iron, calling for shipment to the smaller Central European countries, were placed during the week.

Plates and Sheets

One of the dullest weeks in years was encountered by sellers of both plates and sheets, who see no immediate prospect of a resumption in buying on any greatly increased scale. Telephones simply are not ringing these days, indicating that even the hand-to-mouth buying that has prevailed is slackening. Plate sellers anticipate no important railroad activity this year, and base their chief hopes of new business on the refinery equipment manufacturers who have further commitments to make on projects started some time ago. Recent sales from this source have been absent, however, for some weeks.

Sheet sales are in small lots, with most of the light tonnages coming from fabricators. Jobber buying is extremely slow, with little prospect of much activity as high inventories are being reduced at a slow rate. As to the manufacturers, however, it is apparent that material is being consumed at a faster rate than buying would indicate.

. . SAN FRANCISCO . .

. . . 13,950 tons of plates required for tanks for Japan.

o o o

. . . Bureau of Reclamation will take bids on 83,000 tons of steel.

SAN FRANCISCO, Nov. 4.—The award by Japanese interests of 45 82,000-bbl. tanks, involving 13,950 tons of plates, is reported to be imminent. It is expected that of this number 18 will be awarded to Bethlehem Steel Co. and 18 to Chicago Bridge & Iron Works through Eastern offices; the remaining nine probably will go to Western Pipe & Steel Co., San Francisco.

The U. S. Bureau of Reclamation has indicated that bids will open Dec. 10 for placing and installing 83,000 tons of reinforcing steel, pipe and fittings, gates and operating devices, metal work, penstocks, and cranes at Grand Coulee Dam, Washington. Bids for furnishing 49,000 tons of this material are expected to be called for the same date.

Swift & Co., Chicago have called for bids until Nov. 29 for the construction of a packing plant at Vernan, Cal. The work includes a six-story reinforced concrete cooler building, a four-story reinforced concrete manufacturing building, a five-story reinforced concrete slaughtering building, a reinforced concrete barrel washing building, and structural steel and timber runways and pens.

The largest shape award of the week, 1600 tons for the construction of a Panama Canal dock, went to Bethlehem Steel Co. Structural awards for the week totaled 2792 tons. Expected steel awards on two industrial projects and plans for a school campaign indicate increased future activity in southern California.

New projects involving 1546 tons of cast iron pipe gave that field unexpected activity. The East Bay Municipal Utility district, Oakland, Cal., calls for bids until Nov. 10 on 715 tons 6-in. and 8-in. pipe.

Reclamation bureau awards account for most of the 2247 ton reinforcing bar aggregate.

. . PHILADELPHIA . .

. . . Operations off two more points to 50 per cent.

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. . . Lukens - Alan Wood merger rumor shows imagination.

o o o

. . . Youngstown secures 750-ton pipe award.

PHILADELPHIA, Nov. 2.—With the three open hearths at Pencoyd down for practically the entire week and Bethlehem easing off on production, the district's average operating rate has dropped another two points to 50 per cent of estimated capacity. An additional discouraging factor is the realization that new business received over the past week has not been in sufficient volume to support even this rate of activity, the obvious conclusion being that additional declines may be expected over the remainder of the year. No mill here has built up any significant stock of semi-finished steel so far, thus leading to the conclusion that when and if consumers come in for heavier commitments such action will be almost immediately translated into improved open-hearth operations.

A published report on Saturday stated that Lukens Steel Co. and Alan Wood Steel Co. were planning a merger, and considerable comment in this territory has resulted together with no little wonder as to the possible advantage of such a combination as opposed to a number of disadvantages. Both companies involved scoff at the idea and are not a little curious as to how the report originated.

In the absence of consumer interest of any size whatsoever, the scrap market here has again undergone a minor revision. However, a rather ambiguous situation has been created by the return of temporary purchasing for export at fairly high price levels.

Pig Iron

Melters are buying fill-in lots only when they absolutely need tonnage, and for this reason most furnace representatives have no backlogs of any size. In certain instances furnace stocks have shown a tendency recently to increase, but the situation is occasioning no great amount of concern as sellers look for a decided improvement early next quarter. Indicative of the firm position of the local market is the inability of foreign buyers to secure much iron at a price concession, even though there are currently some very attractive inquiries out at $5 to $8 under the current market level. Alan Wood's export order to Japan is about cleaned up, and its smaller stack will be blown out within the fortnight for much needed repairs. Bethlehem may blow out several stacks also.

Plates and Shapes

The outstanding fabricated plate award of the week involved about 750 tons for 24-in. welded pipe for the City of Philadelphia, which was secured by Youngstown Sheet & Tube Co. Day-to-day demands for plate are very poor, and several local producers have dropped production down to a minimum. Some attractive fabricated shapes jobs are going the rounds, although shops are so in need of business that prices are being cut to the bone on new inquiries. The general business situation has influenced Armstrong Cork Co. to cancel its inquiry of 1200 tons for new buildings at Lancaster, Pa., and other companies planning construction programs are also holding their work in abeyance until the business skies show a better color. Some private construction and several highway projects accounted for about 300 tons of shapes awards during the week, and active tonnage is now limited to about 500 tons for highway construction, 1200 tons for a hospital at Torrance, Pa., and 5000 tons for the Finance Building at Harrisburg. Reinforcing bars gave a somewhat better performance during the week, with awards totaling about 550 tons and new projects amounting to almost 600 tons.

Sheets and Strip

The number of new orders is quite encouraging but, contrarily, the total tonnage involved shows little or no improvement over the poor volume of the past three weeks. Many users continue to work off stocks and are only replacing odd-lots until they get their inventory statements made up. The approaching inventory and holiday periods undoubtedly will keep demands down to a very low level over the remainder of the year, but there is a widespread belief that January requirements will show a smart pickup. The most encouraging aspect of the present situation is the definite firmness of quotations. Buyers have been unable to find soft spots in the price structure, try as they will.

Imports

The following iron and steel imports were received here during the past week: 1500 tons of chrome ore from the Philippine Islands; 26 tons of wire rods, 96 tons of steel tubes, 78 tons of steel forgings, 71 tons of steel billets and 100 tons of steel bars from Sweden; 89 tons of steel bars, 64 tons of structural shapes and 43 tons of steel bands from Belgium.

. . . . ST. LOUIS. . . .

. . . Orders improve slightly; operations at 46%.

ST. LOUIS, Nov. 2.—A slight improvement in placing of orders with steel mills was noted during the week. The orders were small and for immediate consumption. Buying was in plates, shapes and bars, but no structural.

Reinforcing bars awarded during the week included: 1000 tons for a highway bridge at Wickliffe, Ky., to Knoxville Iron Co.; 600 tons for a Psychopathic Hospital, St. Louis to Laclede Steel Co., and 350 tons for a marine hospital here, to Sheffield Steel Corp.

Sales and shipments of pig iron continue light, orders being confied largely to carloads for spot shipments. With the exception of the agricultural implement trade, which is at full capacity, there is a decline in the melt.

Ingot production is down to 41.6 per cent of capacity.

. . .NON-FERROUS. . .

. . . Copper reduced to 11.75c. per lb.

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. . . Zinc shipments slacken; lead demand light.

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. . . Tin prices move in narrow limits.

NEW YORK, Nov. 2.—Interest in non-ferrous metals is at a low level, notwithstanding the lowered prices which thus far have served to encourage only short-lived buying activity. Late last Tuesday, primary copper producers that had been maintaining the 13c. level against the 12c. price of a custom smelter, came into the market on the 12c. basis. On Wednesday the custom smelter that inaugurated the past reductions, lowered quotations to 11.75c. per lb., Connecticut Valley, for the electrolytic grade, but was not followed by the primary producers, so that a split price again exists in the copper market. October deliveries of the red metal are estimated to be about 20 per cent under the September figure, which would make the October total around 53,000 tons. The demand for export metal has been in fair volume, quotations today hovering around 10.90c. per lb., c.i.f., usual European base ports.

Zinc

Sales for the week were light, probably in the neighborhood of 650 tons, at the unchanged price level of 6.10c. per lb., New York. Consumption is still on a high plane, although shipments have shown a tendency to slacken in the past two weeks. The domestic price has received considerable support during the week from the improved sentiment on the London Exchange, where moderate tonages have been bought at prices ranging between 3.72c. and 3.82c. per lb.

Tin

The feature of the week's market was the narrow limits to which the price movement confined itself, in contrast to the violent actions that have characterized it in the past month. Little consumer interest has been in evidence, despite the lowest prices that have prevailed for some time. After declining slightly on Wednesday, the market recovered to 48.50c. on Thursday, but moved to lower ground over the week-end. Straits metal today is quoted at 47.75c. per lb., New York. Tin buying in London responded to the improved sentiment in Wall Street in the fore part of the week and advanced to £210 15s., but this movement was not supported by buying here and the market reacted downward to £206 5s., today.

Lead

There has been no change in the basic position of the market. Demands continue light, with November positions accounting for the bulk of the week's sales. Buying has been well diversified throughout the consuming trades and prices remain steady and unchanged at 5.50c. per lb., New York. December books opened today but received little attention.

The average prices of the major non-ferrous metals in September, based on the daily quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper, Conn. Valley	12.06c. per lb.
Lake copper, Eastern delivery	12.965c. per lb.
Straits tin, spot, New York	51.524c. per lb.
Zinc, East St. Louis	6.10c. per lb.
Zinc, New York	6.45c. per lb.
Lead, St. Louis	5.60c. per lb.
Lead, New York	5.75c. per lb.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 27	Oct. 28	Oct. 29	Oct. 30	Nov. 1
Electrolytic copper, Conn.*	12.00	11.75	11.75	11.75	11.75
Lake copper, N. Y.	12.125	12.125	12.125	12.125	12.125
Straits tin spot, New York	47.625	48.50	48.25	....	47.75
Zinc, East St. Louis	5.75	5.75	5.75	5.75	5.75
Zinc, New York	6.10	6.10	6.10	6.10	6.10
Lead, St. Louis	5.35	5.35	5.35	5.35	5.35
Lead, New York	5.50	5.50	5.50	5.50	5.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin, 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 17.25c. a lb., prompt, f.o.b., New York.
Antimony, American, 17.25c. per lb., prompt shipment, New York.
Quicksilver, $85.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 12.25c. a lb., less carload, delivered in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	49.00c. to 50.00c.
Tin, bar	51.00c. to 52.00c.
Copper, Lake	13.00c. to 14.00c.
Copper, electrolytic	13.00c. to 14.00c.
Copper, castings	12.75c. to 13.75c.
*Copper sheets, hot-rolled	20.125c.
*High brass sheets	18.125c.
*Seamless brass tubes	20.875c.
*Seamless copper tubes	20.875c.
*Brass rods	14.625c.
Zinc, slabs	7.25c. to 8.25c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	13.00c.
Lead, American pig	6.50c. to 7.50c.
Lead, bar	7.75c. to 8.75c.
Lead, sheets, cut	10.00c.
Antimony, Asiatic	19.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	33.00c. to 34.00c.
Babbitt metal, commercial grade	25.00c. to 65.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 35 per cent allowed off for extras, except copper sheets and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	51.75c.
Tin, bar	53.75c.
Copper, Lake	13.00c. to 13.25c.
Copper, electrolytic	13.00c. to 13.25c.
Copper, castings	12.75c. to 13.25c.
Zinc, slabs	8.75c. to 9.00c.
Lead, American pig	6.00c. to 6.25c.
Lead, bar	9.50c. to 10.00c.
Antimony, Asiatic	18.00c. to 18.50c.
Babbitt metal, medium grade	20.00c.
Babbitt metal, high grade	55.75c.
Solder, ½ and ½	38.75c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.125c.	8.375c.
Copper, hvy. and wire	7.50c.	8.00c.
Copper, light and bottoms	6.50c.	6.75c.
Brass, heavy	4.625c.	5.25c.
Brass, light	4.00c.	4.75c.
Hvy. machine composition	7.00c.	7.50c.
No. 1 yel. brass turnings	5.25c.	5.75c.
No. 1 red brass or compos. turnings	6.75c.	7.25c.
Lead, heavy	4.50c.	4.875c.
Cast aluminum	10.625c.	11.75c.
Sheet aluminum	12.75c.	14.25c.
Zinc	3.00c.	3.375c.

IRON AND STEEL SCRAP

. . . Market shows continued softness in the almost complete absence of transactions.

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. . . Composite declines 41c. to $14.42.

NOV. 2.—With the continued curtailment of shipments to mills and the almost complete absence of new sales into consumption, broker-dealer transactions have practically ceased also. There is little evidence of the laying down of any scrap on the part of dealers, even at today's low prices. Prices are therefore largely nominal, being based on meager data and softened by sentiment and the lack of takers at offered prices. Predicated on a small sale of No. 1 steel at $15 at Pittsburgh and dealer willingness to sell for less, the price for the primary grade is down 50c. there, a like amount at Philadelphia in sympathy, and 25c. at Chicago, where trading is almost at a standstill. This decline brings THE IRON AGE composite price down to $14.42, off 41c. from last week and a new low for the year. Total fall from the peak of $21.92 in April is $7.50, or 34 per cent. In other centers and on other grades, the drops have been even larger, being around $1 a ton at Cleveland and Youngstown and as much as $2 in Detroit on as important an item as hydraulic bundles.

Pittsburgh

The market is no stronger than a week ago and if anything shows a softer tone. A negligible amount of No. 1 heavy melting was sold into consumption at $15 a ton and more than a few brokers are willing to make sales at $15 a ton and in some cases even at $14.50. Mills are still uninterested and embargoes on shipments remain in effect. Accordingly No. 1 steel is off 50c. a ton, being quotable at $14.50 to $15. A railroad list closing this week might clarify the situation, although most brokers are of the opinion that realized prices will be somewhat below those of a month ago.

Chicago

Trading is almost at a standstill, brokers not wishing to make large purchases because of shipping curtailments at the mills and the general uncertainty of the situation. Prices therefore are not overly significant, the amount of business being such that accurate quotations on all grades are not available. Heavy melting steel is quoted at $13.50 to $14, other items being marked down from 25c. to $1. Railroad steel sold at $13.70 a gross ton delivered.

Cleveland

Prices have again declined $1 a ton on most grades in both the Cleveland and Youngstown districts. No. 1 heavy melting steel is now quoted at $14 to $14.50 in Cleveland and $15 to $15.50 in Youngstown. There is no consumer demand to support the market and large stocks and reduction in consumption indicate that it will be some time before mills make sizable purchases. Leading Youngstown mills are still holding up shipments and little scrap is being taken by Cleveland steel plants. The New York Central Railroad is offering 7500 tons of heavy melting steel in its monthly list against which bids will be taken Nov. 4.

Buffalo

There has not been a single sale to peg a quotation, but the market is nominally weaker. Offerings of "bargain" scrap have attracted no interest among mills. No. 2 scrap offered at a price close to the quoted price last week found no takers. Mills are continuing to receive large quotas by water and one of the largest consumers is still suspending shipments from local dealers while another is restricting.

St. Louis

Lack of buying by the mills in the St. Louis area has caused further declines in the scrap market. Offerings of material are light, due to the low prices prevailing, and railroads and country dealers are holding on to their scrap. There is very little distress scrap to be had. Mills' stocks of scrap are said not to be heavy.

Cincinnati

The old materials market is without noticeable activity. Dealers are refusing offerings since they lack orders on which to apply purchases. Some purchasing for yard supplies is reported, but the volume is not great. Prices are weak and dealers' bids tend lower. Shipments are at low rate and represent urgent consumer needs.

Detroit

Further withdrawal from bidding on factory lists last week accompanied the most abrupt drop of the year in Detroit scrap prices. Courtesy bids in several cases resulted in sales which forced buyers to lay scrap down, but no purchases for speculation have been noted. Cancellations are being forced on dealers in many cases and rejection rate on deliveries is higher than normal.

New York

Movement of scrap into domestic consumption has practically ceased, and with no new orders to cover, broker transactions have reached a standstill. Hence prices are purely nominal in the absence of test. Export material shows some signs of strength in that brokers have maintained their buying prices for the second week, whereas sharp declines had been the order for many weeks. The availability of more ocean bottoms is largely responsible for the stronger tone.

Boston

Rather drastic reductions in prices for some kinds of scrap have been made. Bundled skeleton and Nos. 1 and 2 steel for export have been cut $2 a ton, blast furnace material is off $1, and shafting and chemical borings 50c. The market for heavy melting steel for Pennsylvania delivery is down $1 a ton, but nominal, and the reduction in export prices is purely sentimental because there is no buying to really establish a market. Sales of skeleton and blast furnace material have been made at the new prices, however. Foundries are taking machinery and textile scrap a little more freely and prices have been shaded 50c. a ton in some instances. Exporters now say more vessel space will be available before the middle of November.

Philadelphia

This market has no semblance of life as far as domestic business is concerned, and for this reason prices have again undergone a moderate downward revision. However, a minor fillip has been imparted to the situation recently by the arrival of a boat to take on about 7000 tons for export, this being the first major foreign shipment from this area since agitation for a scrap embargo reached its peak about three months ago. The current shipment is somewhat odd for another reason, that being that it will include about 5000 tons of No. 1 steel contained in the October scrap list of the Pennsylvania Railroad, probably acquired at a price of over $18, Girard Point.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.50 to $15.00
Railroad hvy. mltng.	15.50 to 16.00
No. 2 hvy. mltng. steel	13.00 to 13.50
No. 2 RR. wrought	14.50 to 15.00
Scrap rails	15.50 to 16.00
Rails 3 ft. and under	19.50 to 20.00
Comp. sheet steel	14.50 to 15.00
Hand bundled sheets	13.50 to 14.00
Hvy. steel axle turn.	13.00 to 13.50
Machine shop turn.	9.50 to 10.00
Short shov. turn.	10.50 to 11.00
Mixed bor. & turn.	10.50 to 11.00
Cast iron borings	10.50 to 11.00
Cast iron carwheels	16.00 to 16.50
Hvy. breakable cast	13.00 to 13.50
No. 1 cupola cast	17.00 to 17.50
RR. knuckles & cplrs.	19.00 to 19.50
Rail coil & leaf springs	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet crops	19.00 to 19.50
Low phos. sh. bar	18.50 to 19.00
Low phos. punchings	17.00 to 17.50
Low phos. plate, hvy.	17.00 to 18.00
Low phos. plate clips	16.00 to 16.50
Steel car axles	19.00 to 19.50

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.50 to $15.00
No. 2 hvy. mltng. steel	12.50 to 13.00
Hydraulic bund., new	14.50 to 15.00
Hydraulic bund., old	11.00 to 11.50
Steel rails for rolling	18.50 to 19.00
Cast iron carwheels	17.50 to 18.00
Hvy. breakable cast	15.50 to 16.00
No. 1 cast	17.50 to 18.00
Stove plate (steel wks.)	13.50 to 14.00
Railroad malleable	17.50 to 18.50
Machine shop turn.	10.50 to 11.00
No. 1 blast furnace	9.50 to 10.00
Cast borings	10.00 to 10.50
Heavy axle turnings	13.00 to 13.50
No. 1 low phos. hvy.	21.50 to 22.50
Couplers & knuckles	21.00 to 22.00
Rolled steel wheels	21.00 to 22.00
Steel axles	22.50 to 23.00
Shafting	20.50 to 21.00
No. 1 RR. wrought	17.50 to 18.00
Spec. iron & steel pipe	14.50 to 15.00
No. 1 forge fire	14.50 to 15.00
Cast borings (chem.)	13.50 to 14.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$13.50 to $14.00
Auto. hvy. mltng. steel alloy free	12.25 to 12.75
No. 2 auto. steel	10.25 to 10.75
Shoveling steel	13.50 to 14.00
Hydraul. comp. sheets	12.50 to 13.00
Drop forge flashings	10.50 to 11.00
No. 1 busheling	12.50 to 13.00
Rolled carwheels	16.50 to 17.00
Railroad tires, cut	17.00 to 17.50
Railroad leaf springs	17.00 to 17.50
Steel coup. & knuckles	17.00 to 17.50
Axle turnings	13.00 to 13.50
Coil springs	20.00 to 20.50
Axle turn (elec.)	13.50 to 14.00
Low phos. punchings	17.00 to 17.50
Low phos. plates, 12 in. and under	17.50 to 18.00
Cast iron borings	9.00 to 9.50
Short shov. turnings	8.75 to 9.25
Machine shop turn.	6.75 to 7.25
Rerolling rails	16.00 to 16.50
Steel rails under 3 ft.	16.75 to 17.25
Steel rails under 2 ft.	17.25 to 17.75
Angle bars, steel	15.50 to 16.00
Cast iron carwheels	15.75 to 16.25
Railroad malleable	14.50 to 15.00
Agric. malleable	12.50 to 13.00
	Per Net Ton
Iron car axles	$19.75 to $20.25
Steel car axles	18.75 to 19.25
No. 1 RR. wrought	11.75 to 12.25
No. 2 RR. wrought	12.00 to 12.50
No. 2 busheling, old	5.50 to 6.00
Locomotive tires	15.50 to 16.00
Pipes and flues	10.00 to 10.50
No. 1 machinery cast	12.00 to 12.50
Clean auto. cast	12.00 to 12.50
No. 1 railroad cast	11.00 to 11.50
No. 1 agric. cast	11.00 to 11.50
Stove plate	9.50 to 10.00
Grate bars	10.00 to 10.50
Brake shoes	10.00 to 10.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$15.00 to $15.50
Hydraulic bundles	14.00 to 14.50
Machine shop turn.	12.00 to 12.50

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.00 to $14.50
No. 2 hvy. mltng. steel	13.00 to 13.50
Comp. sheet steel	13.50 to 14.00
Light bund. stampings	10.00 to 10.50
Drop forge flashings	15.00 to 15.50
Machine shop turn.	9.00 to 9.50
Short shov. turn.	11.00 to 11.50
No. 1 busheling	13.00 to 13.50
Steel axle turnings	10.50 to 11.00
Low phos. billet and bloom crops	22.00 to 22.50
Cast iron borings	11.00 to 11.50
Mixed bor. & turn.	11.00 to 11.50
No. 2 busheling	10.50 to 11.00
No. 1 cast	18.50 to 19.00
Railroad grate bars	9.50 to 10.00
Stove plate	8.50 to 9.00
Rails under 3 ft.	19.00 to 19.50
Rails for rolling	17.00 to 17.50
Railroad malleable	17.00 to 17.50
Cast iron carwheels	17.00 to 17.50

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel	$14.50 to $15.50
No. 2 hvy. mltng. steel	12.50 to 13.00
Scrap rails	14.50 to 15.00
New hvy. b'ndled sheet	12.50 to 13.00
Old hydraul. bundles	11.50 to 12.00
Drop forge flashings	12.50 to 13.00
No. 1 busheling	12.50 to 13.00
Hvy. axle turnings	12.50 to 13.00
Machine shop turn.	8.50 to 9.00
Knuckles & couplers	17.50 to 18.00
Coil & leaf springs	17.50 to 18.00
Rolled steel wheels	17.50 to 18.00
Low phos. billet crops	18.50 to 19.00
Shov. turnings	11.00 to 11.50
Mixed bor. & turn.	9.50 to 10.00
Cast iron borings	9.50 to 10.00
Steel car axles	17.50 to 18.00
No. 1 machinery cast	15.50 to 16.00
No. 1 cupola cast	14.50 to 15.00
Stove plate	12.50 to 13.00
Steel rails under 3 ft.	18.00 to 18.50
Cast iron carwheels	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Chemical borings	12.00 to 12.50

ST. LOUIS

Dealers' buying prices per gross ton delivered to consumer:

Selected hvy. melting	$14.00 to $14.50
No. 1 hvy. melting	14.00 to 14.50
No. 2 hvy. melting	13.00 to 13.50
No. 1 locomotive tires	16.00 to 16.50
Misc. stand.-sec. rails	14.00 to 14.50
Railroad springs	19.00 to 19.50
Bundled sheets	9.00 to 9.50
No. 1 busheling	9.00 to 9.50
Cast bor. & turn.	7.50 to 8.00
Rails for rolling	16.00 to 16.50
Machine shop turn.	7.50 to 8.00
Heavy turnings	10.00 to 10.50
Steel car axles	19.50 to 20.00
Iron car axles	21.50 to 22.00
No. 1 RR. wrought	10.00 to 10.50
No. 2 RR. wrought	14.00 to 14.50
Steel rails under 3 ft.	17.50 to 18.00
Steel angle bars	16.00 to 16.50
Cast iron carwheels	17.00 to 17.50
No. 1 machinery cast	13.25 to 13.75
Railroad malleable	15.00 to 15.50
No. 1 railroad cast	13.25 to 13.75
Stove plate	10.75 to 11.25
Agricul. malleable	11.00 to 11.50
Grate bars	11.25 to 11.75
Brake shoes	10.50 to 11.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$12.00 to $12.50
No. 2 hvy. mltng. steel	9.50 to 10.00
Scrap rails for mltng.	16.50 to 17.00
Loose sheet clippings	8.50 to 9.00
Hydrau. b'ndled sheets	12.50 to 13.00
Cast iron borings	6.50 to 7.00
Machine shop turn.	8.00 to 8.50
No. 1 busheling	10.50 to 11.00
No. 2 busheling	5.00 to 5.50
Rails for rolling	18.50 to 19.00
No. 1 locomotive tires	15.00 to 15.50
Short rails	19.00 to 19.50
Cast iron carwheels	13.50 to 14.00
No. 1 machinery cast	12.50 to 13.00
No. 1 railroad cast	11.00 to 11.50
Burnt cast	7.50 to 8.00
Stove plate	7.50 to 8.00
Agricult. malleable	12.50 to 13.00
Railroad malleable	14.50 to 15.00
Mixed hvy. cast	9.00 to 9.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$16.00 to $16.50
Scrap steel rails	17.00
Short shov. turnings	8.50
Stove plate	10.50
Steel axles	18.00 to 19.00
Iron axles	18.00 to 18.00
No. 1 RR. wrought	18.00 to 18.00
Rails for rolling	18.00 to 20.00
No. 1 cast	18.00 to 18.00
Tramcar wheels	16.00 to 18.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$10.25 to $10.75
No. 2 hvy. mltng. steel	9.00 to 9.50
Borings and turnings	6.25 to 6.75
Long turnings	5.75 to 6.25
Short shov. turnings	7.00 to 7.50
No. 1 machinery cast	12.00 to 12.50
Automotive cast	13.00 to 13.50
Hvy. breakable cast	10.50 to 11.00
Hydraul. comp. sheets	11.00 to 11.50
Stove plate	7.75 to 8.25
New factory bushel	10.00 to 10.50
Old No. 2 busheling	6.50 to 7.00
No. 2 busheling (black fender stock)	Nominal
Sheet clippings	7.50 to 8.00
Flashings	9.50 to 10.00
Low phos. plate scrap	11.50 to 12.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$11.00 to $11.50
No. 2 hvy. mltng. steel	9.50 to 10.00
Hvy. breakable cast	11.50 to 12.00
No. 1 machinery cast	13.50 to 14.00
No. 2 cast	11.50 to 12.00
Stove plate	8.50 to 9.00
Steel car axles	23.00 to 23.50
Shafting	17.00 to 17.50
No. 1 RR. wrought	14.00 to 14.50
No. 1 wrought long	13.50 to 14.00
Spec. iron & steel pipe	11.50 to 12.00
Rails for rolling	16.00 to 16.50
Clean steel turnings	7.25 to 7.75
Cast borings	7.00 to 7.50
No. 1 blast furnace	5.50 to 6.00
Cast borings (chem.)	11.00 to 11.50
Unprepar. yard scrap	6.50 to 7.00
Per gross ton, delivered local foundries:	
No. 1 machn. cast	$16.50 to $17.50
No. 1 hvy. cast cupola	13.50 to 14.00
No. 2 cast	13.00 to 13.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$13.30 to $14.30
Scrap rails	13.30 to 14.30
No. 2 steel	12.30 to 13.30
Breakable cast	13.00 to 13.50
Machine shop turn.	6.20
Mixed bor. & turn.	4.60
Bund. skeleton long	7.95
Shafting	17.50 to 18.00
Cast bor. chemical	8.50 to 9.00
Per gross ton delivered consumers' yards:	
Textile cast	$16.50 to $17.00
No. 1 machine cast	16.50 to 17.00

PACIFIC COAST

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$14.00 to $15.00
No. 2 hvy. mltng. steel	11.50

CANADA

Dealers' buying prices at their yards, per gross ton:

	Toronto	Montreal
No. 1 hvy. mltng. stl.	$14.50	$14.00
No. 2 hvy. mltng. stl.	13.50	13.00
Mixed dealers steel	12.50	12.00
Scrap pipe	11.75	11.50
Steel turnings	9.75	9.50
Cast borings	11.00	10.50
Machinery cast	18.00	17.00
Dealers cast	16.00	15.00
Stove plate	12.00	11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, barges.	
No. 1 hvy. mltng. steel	$13.00 to $13.50
No. 2 hvy. mltng. steel	12.00 to 12.50
No. 2 cast	11.00
Stove plate	9.00
Boston on cars at Army Base or Mystic Wharf	
No. 1 hvy. mltng. steel	$13.50
No. 2 hvy. mltng. steel	12.50
Rails (scrap)	13.50

Philadelphia, delivered alongside boats, Port Richmond

No market at present.

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. to 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.74c.
Del'd New York	2.78c.
F.o.b. Birmingham	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars Pacific Ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.60c.
Del'd Detroit	2.70c.
F.o.b. cars dock Gulf ports	2.95c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.80c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.435c.
Del'd New York	2.53c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.455c.
Del'd New York	2.5025c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb.	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.69c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10 wrought iron, Pgh.	4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.44c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	3.10c.
No. 10 gage, f.o.b. Gary	3.20c.
No. 10 gage, f.o.b. Detroit	3.30c.
No. 10 gage, del'd Philadelphia	3.39c.
No. 10, f.o.b. Granite City	3.30c.
No. 10 gage, f.o.b. Birmingham	3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.55c.
No. 20 gage, f.o.b. Gary	3.65c.
No. 20 gage, del'd Detroit	3.75c.
No. 20 gage, del'd Philadelphia	3.84c.
No. 20, f.o.b. Granite City	3.75c.
No. 20 gage, f.o.b. Birmingham	3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports	4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.09c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Electrical Sheets
(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars, dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	$4.65
F.o.b. Gary	4.75
F.o.b. Granite City	4.85

Roofing Terne Plate
(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)	
8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-Rolled Hoops, Bands, Strip and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.40c.
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.48c.
F.o.b. Worcester	3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.45c.
No. 20, Pittsb'gh or Cleveland	3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smoth coated nails	$2.75
Cut nails, carloads	$3.60

	Base per 100 Lb.
Annealed fence wire	$3.20
Galvanized fence wire	3.60
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column.	74
Single loop bale ties, base col.	63

Chicago and Andersen, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $2 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel In.	Black	Galv.	Wrought Iron In.	Black	Galv.
⅛	52	31	¼ & ⅜	+13	+35
¼ to ⅜	55	38½	½	20	1½
½	59½	49	¾	26	8
¾	62½	53	1 & 1¼	30	14
1 to 3	64½	55½	1½	34	16½
			2	33½	16

Lap Weld

2	57	47½	2	26½	10
2½ & 3	60	50½	2½ to 3½	27½	12½
3½ to 6	62	52½	4	29½	16
7 & 8	61	50½	4½ to 8	28½	15
9 & 10	60½	50	9 to 12	24½	10
11 & 12	59½	49			

Butt Weld, extra strong, plain ends

⅛	50½	36½	¼ & ⅜	+14	+48
¼ to ⅜	52½	40½	½	21	4
½	57½	48½	¾	27	10
¾	61½	52½	1 to 2	34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	29½	13½
2½ & 3	59	50½	2½ to 4	35	20½
3½ to 6	62½	54	4½ to 6	33½	19
7 & 8	61½	51	7 & 8	34½	19½
9 & 10	60½	50	9 to 12	28	15½
11 & 12	59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2½ in. o.d.	13 B.W.G.	19.37	17.21
2¾ in. o.d.	13 B.W.G.	21.22	18.85
2¾ in. od.	13 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

40,000 lb. or ft. or over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft	65%

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	56.00
F.o.b. dock, Seattle	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra. 4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago; and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
½ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
½ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
½ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	$3.60
F.o.b. Chicago or Birmingham	3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more.)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in dia. and smaller	75
Milled headless set screws, cut thread ⅝ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem. Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
200 (½% Nickel)	$0.35
2100 (1½% Nickel)	0.75
2300 (3½% Nickel)	1.55
2500 (5% nickel)	$2.35
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.35

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finishd Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	80c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 5c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	23s. 9d. to 24s. 3d.
Steel bars, open-hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£15
Galvanized sheets, No. 24 gage	£13 15s.

CONTINENTAL

Per Gross Ton, Gold f.o.b. Continental Ports

Billets, Thomas	£4 7s. 6d.
Wire rods, No. 5 B.W.G.	£6 15s.
Steel bars, merchant	£6 to £6 5s.
Sheet bars	£4 8s. 6d.
Plate ¼ in. and up	£6 17s. 6d. to £7
Plate 3/16 in. and 5 mm.	£7 [illegible] 6d.
Sheet, ⅛ in.	£8 [illegible] 6d.
Beams, Thomas	£6 2s. 6d.
Angles (Basic)	£6 2s. 6d.
Hoops and strip, base	£7 to £7 5s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	3.80c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bundles	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large .....1 to 24 kegs	3.90c.
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO *Base per Lb.*

Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-rolled annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bolts (keg lots)	5.05
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05
	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.25 to 7.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled; strip, soft and quarter hard	3.92c.
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.32c.
Galvanized sheets (No. 24*)	4.50 to 5.47c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretcher leveled	6.05c.
SAE, 2300, hot-rolled	7.32c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.55c.
Floor plate, ⅛ in. and heavier	5.60c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x ⅛ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.34c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	5.29c.
Boiler rivets	5.39c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	50
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts; all quantities	60

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.90c.
*Structural shapes	3.90c.
*Soft steel bars, small shapes, iron bars (except bands)	4.00c.
‡Reinforc. steel bars, sq. twisted and deformed	3.53c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	4.10c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	4.00c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.86c.
Soft steel bars	3.75c.
†Reinforc. steel bars	2.60c.
‡Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg:	
Any quantity less than carload	3.20
Cement c't'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes, 2-in.	20.73
4-in.	48.41

BUFFALO *Base per Lb.*

Plates	3.92c.
Floor plates	5.52c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.30c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

	Base per Lb.
Channels, angles	4.20c.
Tees and zees, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.49c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.85c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

*Under 400 lb., .50c. over base, 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c; 3500 lb. and over, base less 15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5.81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails 1 to 14 kegs	3.25c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60-5
1⅛ in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
¼ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.85c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BIRMINGHAM

Bars and bar shapes	$3.35	base
Structural shapes and plates	3.75	"
Hot rolled sheets No. 10 ga.	3.80	"
Hot rolled sheets No. 24 ga.	4.40	" 3500 lb. and over
Galvanized sheets No. 24 ga.	5.05	" 3500 lb. or more
Strip	4.05	"
Reinforcing bars	3.35	"
Floor plates	5.96	"
Cold finished bars	4.91	"
Machine and carriage bolts	.50 & 10 off list	
Rivets (structural)	$4.60 base	

On plates, shapes, bars, hot rolled strip, heavy hot rolled sheets, the base applies on 400 to 3999 lb. All prices are f.o.b. consumer's plant.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb. All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Reinforcing shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.35c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.85c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.65	$3.60	$3.70

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.50
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F. o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.27
Delivered Newark or Jersey City	26.39
Delivered Philadelphia	25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.07
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered San Francisco, Los Angeles or Seattle	26.50
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett, Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

F.o.b. Everett, Mass.	$25.25
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.51
Delivered Canton, Ohio	24.76
Delivered Mansfield, Ohio	25.26
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.39
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.51
Delivered Canton, Ohio	25.76
Delivered Mansfield, Ohio	26.26

Low Phosphorus

Basing points: Birdsboro, Pa. Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.04

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 22.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$33.50
10.51 to 11.00%	34.00
11.01 to 11.50%	34.50
11.51 to 12.00%	35.00
12.01 to 12.50%	35.50
12.51 to 13.00%	36.00
13.01 to 13.50%	36.50
13.51 to 14.00%	37.00
14.01 to 14.50%	37.50
14.51 to 15.00%	38.00
15.01 to 15.50%	38.50
15.51 to 16.00%	39.00
16.01 to 16.50%	39.50
16.51 to 17.00%	40.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$1.80
Ferrotungsten, lots of 5000 lbs., nominally	1.85
Ferrotungsten, smaller lots, nominally	1.90
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.50c.*
Ferrochromium, 2% carbon	16.50c to 17.00c.*
Ferrochromium, 1% carbon	17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.*
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50*
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	63.50
Ferrophosphorus, electric, 24% in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	80.00
Ferromolybdenum, per lb. Mo del	95c.
Calcium molybdate, per lb. Mo del	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$45.00
Ton lots or less, per ton	50.00
Silico-manganese, gross ton, delivered.	
3%	101.50
2.50% carbon grade	106.50
2% carbon grade	111.50
1% carbon grade	121.50

* Spot prices are $5 a ton higher. Spot premium on 75 per cent ferrosilicon is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	$4.95
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	Nominal
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	50c.
Man., African, Indian, 44-48%	Nominal
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered	Nominal
Tungsten, domestic, scheelite delivered	$30.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	$16.00
Rhodesian, 45%	23.00
Rhodesian, 48%	26.50
Turkish, 48-49%	25.50 to $26.50
Turkish, 45-46%	23.50 to 24.00
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50%	$25.50 to $26.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, barge and rail	21.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	22.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	31.50

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd, No. 4 industrial	5.75c.
Del'd Cleve'd, No. 5 industrial	5.00c.

COKE AND COAL

Coke	*Per Net Ton*
Furnace, f.o.b. Connellsville, Prompt	$4.25 to $4.50
Foundry, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.85 to 11.30
Foundry, by-product, Philadelphia	10.60
Foundry, by-product, delivered Cleveland	11.00
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars dock, Pacific ports	14.75

Coal	*Per Net Ton*
Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . New business is spotty; dealer sales for October both above and below September volume.

o o o

. . . Inquiries up in many centers as sentiment improves.

o o o

. . . Foreign orders still a large factor in maintaining backlogs.

Cleveland

AN improvement in the miscellaneous demand for small machine tools is reported by local distributers, this being the first evidence for many weeks of a change for the better. Drilling and tapping machines are the more active items. Dealers are getting little inquiry for medium size and large machines. Business with local machine tool builders continues very slow. A fair volume of orders is in sight, but prospective buyers are showing considerable hesitancy, and the placing of some business now pending is likely to be deferred until the first of the year. Small presses are in good demand from miscellaneous consumers. A moderate improvement in sentiment is in evidence.

Cincinnati

THE machine tool market is spotty. Average demand the past week was slightly under the preceding period, with market feeling uncertain. Planer and boring mill interests indicate fair foreign demand, but appreciable decline in domestic ordering. Other lines are also reporting steadiness of foreign business, but indicate only minor fluctuations in domestic interest. Inquiry, however, for all types of machines is holding to brisk levels with possibility of business materializing when consumer uncertainty is eliminated. Quotations already out are in large volume.

Factories, still eating into backlogs, have not changed operation schedules to any great degree. Production is still at about 70 per cent.

Chicago

CONTRADICTORY reports are being heard from machine tool sales offices here this week, and while one seller estimates October activity to be 30 to 35 per cent under that in September, another expects the month to show an increase in the volume of new business, and sees little change in the rate with which inquiries are being received. Generally, however, inquiries and orders are falling off to some extent, as buyers hold up lists and purchases of one or two tools until financial conditions become better stabilized. Deliveries appear to be improving slightly, and shipments are good. Some believe that a gradual betterment of the delivery situation until the first of the year will result in an increased volume of buying as machines become available sooner, but others express the opinion that foreign orders will fill the plants as soon as domestic activity eases, and that deliveries of the better lines will not lessen greatly. Some steel mill inquiry, mostly from Carnegie-Illinois Steel Corp., has been noticed, the Santa Fe and Milwaukee railroads are inquiring for budget estimates, and the farm implement and tractor makers continue active purchasers.

Detroit

BACKLOGS in a few cases have been nearly exhausted by machine tool builders in this area and tool and die shops are operating on much reduced schedules, with prospects of further reduction on the part of those occupied principally in supplying automobile plant tool requirements. The tone on inquiries continues moderately firm. Deliveries and installations are still the principal problem for a majority of machine tool dealers.

New York

FOR some dealers October turned out to be a much better month than anticipated as far as sales volume is concerned. Orders received during the last week of the month resulted in a better volume for some than in September, although others report a total falling off of about 25 per cent. Not only did orders show a pickup in the last week, but inquiries became generally more active, lending some hope for a fairly active fourth quarter. Among those in the market are a number of the less well known and smaller firms as well as those nationally prominent. The sources are definitely fewer than they were during the summer and early fall. While there was no indication of any concerted effort to restrict purchases during the stock market recession, now that an upturn is indicated, sentiment has improved and buying on a more active scale is anticipated.

Export business is spotty. Few orders have been placed by British sources in the last two weeks, but Japanese and Russian buying continues apace. No let-up is expected for some time, particularly from the latter source, since the machinery is required for a large industrial expansion program envisioned in the third Five Year Plan beginning in January.

Pittsburgh

INQUIRIES have slowed down some from the volume of a few weeks ago. Practically all the lethargy can be traced to unfavorable business sentiment. Orders have also declined from previous levels and it appears that total October business will be below the volume placed in September. Backlogs at machine tool manufacturing plants are irregular in that some companies are still five to six months behind on orders while others are in need of new business. Westinghouse Electric & Mfg. Co. in its earnings report, showed unfilled orders on Sept. 30 amounting to $78,000,000 against $41,000,000 the same time last year. According to this company, inquiries have dropped off and in a few cases prospective orders have been postponed temporarily.

Electric Welding In Hulls Gaining

WASHINGTON, Nov. 2.—Electric welding in hull construction is increasing, according to the Transportation Division of the Bureau of Foreign and Domestic Commerce which reports that oil tankers constructed 18 months ago in which there was "a considerable amount of welding" have not shown the slightest sign of any leak and the experience of owners, builders and designers has encouraged them to go further.

"Tankers of large size are now being built in which, in the words of the designers, the hulls will be 80 per cent welded," the report said. "In a 15,000 ton oil-carrying ship, to be laid in Sweden, it will be nearly 100 per cent." The weight saving of 700 tons will be about 3 per cent of the total steel tonnage used.

PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Hooker Electrochemical Co., 60 East Forty-second Street, New York, manufacturer of industrial chemicals, acids, etc., will begin at once one-story addition to branch plant at Tacoma, Wash. Cost close to $100,000 with equipment. McKim, Mead & White, 101 Park Avenue, New York, are architects; Alan Porter Lee, Inc., 136 Liberty Street, New York, and Wurster & Sanger, Inc., 5201 South Kenwood Avenue, Chicago, are consulting engineers.

General Electric Co., Schenectady, N. Y., has let general contract to H. K. Ferguson Co., Hanna Building, Cleveland, for three additions to branch plant at Decatur, Ind., two one-story units, 30 x 200 ft. and 30 x 150 ft., and one two-story structure, 60 x 150 ft., for expansion in assembling department, storage and distribution, and in loading division, respectively. Cost over $150,000 with equipment.

Metals Powder Co., Inc., 9618 Forty-third Avenue, Corona, L. I., manufacturer of bronze and other metal powders, etc., has leased one-story building at 42-41 Crescent Street, Long Island City, recently completed, for new plant, including processing and experimental divisions.

Magnus, Mabee & Reynard, 32 Cliff Street, New York, manufacturers of essential oils and allied products, has arranged for erection of six-story and basement plant at 16 Desbrosses Street, totaling 60,000 sq. ft. of space, to be occupied under a long-term lease. Cost over $125,000 with equipment. Ely Jacques Kahn, 2 Park Avenue, is architect.

Department of Sanitation, City of New York, 125 Worth Street, has let general contract to Stock Construction Corp., Grand Central Terminal, for one-story service, repair and garage building at 131st Street and 150th Avenue, Bergen Landing, Long Island City, for municipal motor trucks and cars. Cost over $350,000 with equipment. Department also has filed plans for new sludge treatment plant at Powells Cove and 126th Street, College Point, L. I., including two-story machine shop and laboratory, 142 x 211 ft., to cost about $500,000 with equipment; aeration tanks, 198 x 575 ft., cost $400,000; main sludge treatment building, 176 x 187 ft., cost $350,000; one-story service, repair and garage building, with section for grit storage and distribution, cost about $45,000, and other operating units. Entire project will cost close to $1,500,000 with machinery.

Home Fuel Oil Co., Inc., 223 River Drive, Passaic, N. J., is arranging for lease of seven acres at Port Newark, Newark, N. J., for new bulk oil storage and distributing plant, and service, repair and garage building to handle about 70 motor trucks. Cost about $100,000 with equipment; battery of steel storage tanks also to cost $100,000.

Stumpfl, Inc., 56 Woolsey Street, Irvington, N. J., manufacturer of cutlery, has leased 5200 sq. ft. additional space in building now occupied, for expansion.

Schering Corp., 86 Orange Street, Bloomfield, N. J., manufacturer of chemical products, plans new one and multi-story plant near Morris Avenue, Union Township, N. J., where about eight-acre tract has been secured. Cost close to $200,000 with machinery.

Luscombe Airplane Development Corp., Bear Tavern Road, Trenton, N. J., is disposing of a common stock issue to total about $362,000, part of proceeds to be used for one-story addition and other expansion.

Philco Radio & Television Corp., Tioga and C Streets, Philadelphia, has leased about 20,000 sq. ft. in former plant of David Lupton's Sons, Allegheny Avenue and Tulip Street, for expansion, primarily in storage and distributing division.

Volpe Coal Co., Pittston, Pa., has approved plans for new coal tipple at its No. 6 mine, South Pittston. Cost about $40,000 with elevating, conveying and other mechanical-handling equipment.

Standard Plating Works, Inc., 1617-27 North Street, Philadelphia, has acquired property on Olney Avenue, Olney, for new one-story plant, for which contract will be let this month. Cost over $50,000 with equipment. On completion, present plant will be removed to new location and capacity increased.

Publicker Commercial Alcohol Co., 260 South Broad Street, Philadelphia, has let general contract to S. H. Levin, 1619 Sansom Street, for one-story addition to plant at Delaware Avenue and Bigler Street, for expansion in processing department. Cost over $50,000 with equipment.

BUFFALO DISTRICT

Chevrolet Motor Co., 3044 West Grand Boulevard, Detroit, has plans for one-story addition to branch plant at Tonawanda, N. Y., for expansion in foundry. Cost over $75,000 with equipment. Albert Kahn, Inc., New Center Building, Detroit, is architect and engineer. Company has superstructure under way on one-story plant units on adjoining site, with power house, totaling about 800,000 sq. ft. of floor space, for production of automobile engines and parts, gears and axles for Eastern assembling plants. Cost close to $4,000,000 with machinery.

United States Engineer Office, Federal Building, Buffalo, asks bids until Nov. 18 for globe and angle valves (Circular 57).

J. H. Williams & Co., 400 Vulcan Street, Buffalo, manufacturers of drop forgings, have filed plans for expansion and improvements, including new crane runway. Cost close to $35,000.

NEW ENGLAND

Cremo Brewing Co., Belden Street, New Britain, Conn., has plans for several additions, including four-story brew house, one-story mechanical bottling building, one-story additions to woodworking and other shops, one-story addition to motor truck garage and service building, and other units. Cost over $100,000 with equipment. Edward F. Kawiak is engineer.

B. B. Chemical Co., Kendall Square, Cambridge, Mass., manufacturer of general chemical products, is erecting new plant on Memorial Drive, comprising four main units, one two-stories and three one-story structures, totaling 100,000 sq. ft. of floor space. Completion is scheduled next spring. Cost about $350,000 with equipment.

Brown Co., Berlin, N. H., manufacturer of wrapping papers, kraft and other paper stocks, is considering report made by Hardy S. Ferguson & Co., 200 Fifth Avenue, New York, consulting engineers, recommending expansion and improvements at local mill to cost $3,000,000, including new units for pulp and paper divisions, and installation of equipment. Report also recommends expansion at branch sulphate pulp mill at La Tuque, Que., to double present capacity, to cost close to $5,000,000.

Jenkins Brothers, Main Street, Bridgeport, Conn., manufacturer of valves, mechanical rubber products, etc., has asked bids on general contract for one-story foundry. Cost close to $50,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, is architect and engineer.

WASHINGTON DIST.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Nov. 9 for gears, ball bearings, sprockets and roller chains (Circular 134).

City Council, Hagerstown, Md., is considering engineer's report recommending expansion and improvements in municipal electric power plant, including new electric generating unit and auxiliary equipment. Estimated cost $200,000. R. R. Daniels is superintendent of power station.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 15 for one chain hoist, one displacement-type air blower, one centrifugal-type air blower, all motor driven; four bronze propellers, quantity of fasteners for metal roofing and other equipment (Schedule 3298).

Board of District Commissioners, District Building, Washington, has rejected bids recently received for new three-story Dennison vocational school at 1300 Allison Street, N.W., and will ask new bids on general contract soon. Cost about $320,000 with equipment. Nathan C. Wyeth, address noted, is municipal architect.

Commanding Officer, Ordnance Department, Aberdeen Proving Ground, Aberdeen, Md., asks bids until Nov. 8 for one electric drill, one electric sander, one screw plate set, two paint spray guns, three sets of wrenches, one 25-hp. air compressor, one flexible shaft (Circular 42).

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 9 for one motor-driven screw-type pump (Schedule 1959) for Sewall's Point yard; three motor-driven drilling and tapping machines (Schedule 2000), two exhaust gas-heated evaporators and spare parts (Schedule 1961), windlass and spare parts (Schedule 1972), two lubricating oil purifiers and spare parts (Schedule 1989) for Brooklyn Navy Yard; about 320 drill chucks (Schedule 1996) for Brooklyn and Sewall's Point yards; one motor-driven pattern-maker's wood-turning lathe (Schedule 2002), one motor-driven, ball bearing scroll saw (Schedule 2001) for Boston yard; nine chrome molybdenum steel cylinders (Schedule 1987), one motor-driven shaper (Schedule 2004) for Philadelphia yard; one motor-driven pattern-maker's lathe (Schedule 2007) for Portsmouth, N. H., yard; 50 acetylene cylinders, each 225 cu. ft. capacity (Schedule 1999) for Charleston, S. C., yard.

SOUTH ATLANTIC

Apte Canning Co., Miami, Fla., canner and packer of food products, has acquired property at Edinburg, Tex., for new branch plant, with power house and storage and distributing buildings. Cost close to $75,000 with equipment.

Board of Regents, University System of Georgia, Capitol Building, Atlanta, Ga., will ask bids on general contract early this month for two additions to Georgia School of Technology, Ponce de Leon Avenue, N.W., consisting of a three-story and basement mechanics building, 80 x 95 ft., to cost $130,000 with equipment; and three-story civil engineering building, 80 x 100 ft., cost $150,000 with equipment. Harold Bush-Brown, architectural department, Georgia School of Technology, is architect.

SOUTH CENTRAL

Southern States Refining Co., Gulfport, Miss., recently acquired by new interests, headed by C. S. McKendrick, New Orleans, and associates, plans expansion and improvements in local oil refinery, including new equipment, and for storage and distribution. Cost over $75,000 with machinery.

Federal Chemical Co., Starks Building, Louisville, industrial chemicals, has asked bids on general contract for one-story addition to plant at Hancock and Meriwether Streets, 80 x 200 ft., primarily for storage and distribution. Cost close to $45,000 with equipment.

Mohawk Silica Corp., Birmingham, an interest of Birmingham Slag Co., Birmingham, has acquired silica deposits in Calhoun County, near Ohatchee, Ala., and plans new processing plant with steam power house, machine shop and other mechanical departments. Equipment will be installed for mining silica rock. Entire project will cost over $75,000.

Board of City Commissioners, Henderson, Ky., will ask bids soon for exten-

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BROWN & SHARPE

sions and improvements in municipal electric power plant, including new boiler unit, pumping machinery and accessory equipment. Cost over $30,000.

Board of Trustees, Louisiana Polytechnic Institute, Ruston, La., plans new multi-story engineering building and power house. Cost over $150,000 with equipment. Work is scheduled to begin early in 1938. Edwin F. Neild, Sr. and Jr., and D. A. Somdal, City Bank Building, Shreveport, La., are architects.

SOUTHWEST

Gaylord Container Corp., 2820 South Eleventh Street, St. Louis, plans one-story addition to pulp mill of Bogalusa Paper Co., Bogalusa, La., an affiliated organization, for by-products manufacture from pulp mill liquids. Cost over $75,000 with equipment.

Stanolind Oil & Gas Co., and Western Geophysical Co., both Philcade Building, Tulsa Okla., plan joint construction of one-story oil-testing and experimental building. Cost close to $80,000 with tanks and other equipment.

City Council, Peabody, Kan., plans new municipal electric light and power plant. Cost close to $100,000 with engine-generator units, boilers and other equipment. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Board of Water Commissioners, Oklahoma City, Okla., has called special election Dec. 7 to arrange bond issue of $2,800,000 for expansion and improvements in municipal water and sewerage systems, including extensions in water purification works and pumping station, to cost $625,000 with equipment; lime recovery plant at filtration station, cost $100,000; sewage disposal works expansion and improvements, with new mechanical equipment, to cost $800,000, and other work. C. E. Bretz and V. V. Long & Co., Colcord Building, are consulting engineers.

Lone Star Gas Co., 1915 Wood Street, Dallas, Tex., has authorized new compressor station in Wheeler County gas field near Shamrock, Tex., for pipe line service. Cost over $200,000 with compressor units and auxiliary equipment.

Coca-Cola Bottling Co., Marshall, Tex., has let general contract to C. S. Lambie Construction Co., Longview, Tex., for one and two-story mechanical-bottling plant, 68 x 110 ft., with one-story auxiliary building adjoining, 35 x 70 ft. Cost about $50,000 with equipment. Edwin F. Neild, City Bank Building, Shreveport, La., is architect.

City Council, Sherman, Tex., W. Morgan Works, city manager, asks bids until Nov. 8 for 750,000-gal. elevated steel tank and tower, and other waterworks installation. Cost about $165,000. Hawley, Freese & Nichols, Capps Building, Fort Worth, Tex., are consulting engineers.

WESTERN PA. DIST.

Coca-Cola Bottling Co. of Pennsylvania, 1700 Jane Street, Pittsburgh, plans two-story and basement mechanical-bottling plant.

Kanawha By-Products Co., Inc., Charleston, W. Va., plans new coal tipple on Kanawha River, near Cedar Grove, W. Va. Cost close to $45,000 with elevating, conveying, loading and other mechanical-handling equipment.

General State Authority, 600 North Second Street, Harrisburg, Pa., A. S. Janeway, executive director, has plans for new one and multi-story Pennsylvania State Industrial School at Huntingdon. Cost about $300,000 with equipment. Eugene A. Stopper, Liberty Trust Building, Philadelphia, is architect.

OHIO AND INDIANA

Cleveland Tungsten Mfg. Co., 9410 St. Catherine Avenue, Cleveland, manufacturer of contact points and kindred tungsten specialties, has let general contract to Sam W. Emerson Co., 1836 Euclid Avenue, for new one-story plant, 75 x 160 ft., at 10210 Meech Avenue. Cost over $60,000 with equipment. On completion, present plant will be removed to new location and capacity increased. H. M. Morse & Co., 1500 Superior Avenue, are architects.

American Crucible Products Co., Oberlin and Thirteenth Streets, Lorain, Ohio, manufacturer of metal castings, babbitt metal, etc., will take bids soon on general contract for one-story addition to foundry, 36 x 65 ft. Cost about $40,000 with equipment. F. J. McFadden, 442 Oberlin Street, is architect.

Hobart Brothers Co., Troy, Ohio, manufacturer of electric welding equipment, paint spraying apparatus, etc., will proceed with superstructure by day labor on two-story addition, 50 x 120 ft. Cost over $50,000 with equipment.

Heidelberg Brewing Co., 147 McDonaugh Street, Dayton, Ohio, has let general contract to Henry Stock & Son, North Ludlow Street, for one-story addition, 65 x 124 ft., for storage and distribution. Cost close to $40,000 with equipment. R. T. Parrish, 127 Cambridge Avenue, is architect.

Harshaw Chemical Co., 1945 East Ninety-seventh Street, Cleveland, industrial chemicals, etc., plans one-story addition to factory at Elyria, Ohio. Cost over $100,000 with equipment.

Contracting Officer, Materiel Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Nov. 9 for chrome molybdenum seamless steel tubing (Circular 371); until Nov. 12, gate valves, pipe hangers, pipe caps, unions, galvanized nipples, etc. (Circular 376); until Nov. 16, fuel pump drive equipment, including couplings, control cams, fuel cock gear assemblies, control pins, coupling extension shafts, gage shims, fuel cock springs, control washers, control yokes, etc. (Circular 358); until Nov. 22, 866 generator assemblies, 800 generator control panel assemblies (Circular 367).

American Fork & Hoe Co., 1901 West Maryland Street, Evansville, Ind., has let general contract to Anderson & Veatch, 225 S.E. Eighth Street, for one-story addition. Cost close to $40,000 with equipment. Main offices are at Cleveland.

MICHIGAN DISTRICT

Buick Motor Co., Flint, Mich., has let general contract to J. A. Utley, 6031 Mansur Street, for two one-story additions, 60 x 512 ft., and 85 x 90 ft. Cost close to $175,000 with equipment.

Regal Gasoline Engine Co., Coldwater, Mich., manufacturer of engines and parts, has acquired Esco Engineering Service Co., 3120 Monroe Street, Toledo, Ohio, manufacturer of mechanical specialties, and will consolidate. First noted company plans early establishment of factory branch at Detroit for engineering department and other divisions.

Hudson Motor Car Co., 12601 East Jefferson Street, Detroit, has let general contract to Darin & Armstrong, Inc., New Center Building, for one-story top addition to present one-story unit at Connors Avenue plant. Cost over $65,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

Trippensee Mfg. Co., has been organized as an interest of Frank J. Trippensee to manufacture air conditioners, water coolers, compressors for refrigerators and kindred products, and will operate as an associated interest of Standard Reamer & Tool Co., 2630 Elmwood Avenue, Detroit. Production of both companies will be carried on at last noted address. Mr. Trippensee will be president and general manager, and William F. Trippensee, treasurer and production manager.

MIDDLE WEST

Creamery Package Mfg. Co., 1243 West Washington Boulevard, Chicago, manufacturer of dairy machinery and parts, plans several one-story additions and installation of equipment at plant at Arlington Heights, Ill. Cost about $200,000 with machinery.

Quality Hardware & Machine Corp., 5849 North Ravenswood Avenue, Chicago, has let general contract to Edgewater Construction Co., 1426 Farragut Avenue, for one-story addition, 100 x 160 ft. Cost close to $75,000 with equipment. Ivar Viehe-Naess, 5809 North Ridge Avenue, is architect.

Gold Seal Liquors, Inc., 424 South Wells Street, Chicago, has leased a five-story and basement building at Harrison and Desplaines Street, about 60,000 sq. ft. of floor space, for new blending, storage and distributing plant.

Hampton Machine & Tool Co., Hampton, Iowa, has approved plans for one-story machine shop, 50 x 70 ft., and will proceed with erection by day labor.

International Harvester Co., 606 South Michigan Avenue, Chicago, has let general contract to Gust Kleinschmidt & Son, 416 Given Street, Mankato, Minn., for one-story branch, storage and distributing plant, 200 x 300 ft., at Mankato. Cost over $60,000 with equipment.

Continental Oil Co., 2222 North Herndon Street, Chicago, plans new bulk oil storage and distributing plant at Alexandria, Minn., including pumping station, six 10,000-gal. oil tanks and other equipment. Cost close to $50,000 with equipment.

United States Engineer Office, Fort Peck, Mont., asks bids until Nov. 8 for machine bolts, carriage bolts, lock washers, hacksaw blades, chisel blanks, cut washers, nuts, lag screws and two cutting blowpipes (Circular 134).

Commanding Officer, Ordnance Department, Rock Island Arsenal, Rock Island, Ill., asks bids until Nov. 8 for 101,250 malleable iron castings for thumb nuts (Circular 273), 202,000 carbon steel washers (Circular 274), three electric hoists, each 6000-lb. capacity (Circular 276).

PACIFIC COAST

Continental Can Co., 155 Montgomery Street, San Francisco,. has begun superstructure for new one-story plant in El Ricado district, near Stockton, Cal., for which general contract recently was let to Austin Co. of California, Oakland. Cost over $80,000 with equipment. Main offices are at New York.

Motor Grinding Co., Gage Street and McKinley Avenue, Los Angeles, has let general contract to Lee Construction Co., 8811 Cimarron Street, for one-story machine shop, 40 x 61 ft. Cost close to $30,000 with equipment. George J. Fosdyke, 112 North Main Street, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 9 for one motor-driven, light-duty engine lathe (Schedule 1923), one motor-driven tool-maker's precision lathe (Schedule 1949); until Nov. 16, one motor-driven milling machine (Schedule 2006) for San Diego Naval Air Station; hacksaw frames (Schedule 1969) for San Diego and other navy yards; 15,000 ft. of 5/16-in. plow steel wire rope (Schedule 2030) for Mare Island yard; until Nov. 19, 15 steel cylinders and three alloy plungers (Schedule 2026) for Mare Island and Portsmouth yards; until Nov. 9, four motor-driven saddle-type turret lathes (Schedule 1933) for Puget Sound yard.

Gilmore Oil Co., 9701 North Hurst Street, Portland, is considering new bulk oil storage and distributing plant at Tillamook, Ore., including 10,000-gal. steel tanks and other equipment. Cost close to $40,000 with equipment.

Denver, Rio Grande & Western Railroad, 732 Seventeenth Street, Denver, Colo., has let general contract to Ogle Construction Co., 28 East Jackson Boulevard, Chicago, for additions to engine house and shops at Thistle, Utah, including improvements in present units. Cost close to $100,000 with equipment. A. O. Ridgway, first noted address, is chief engineer.

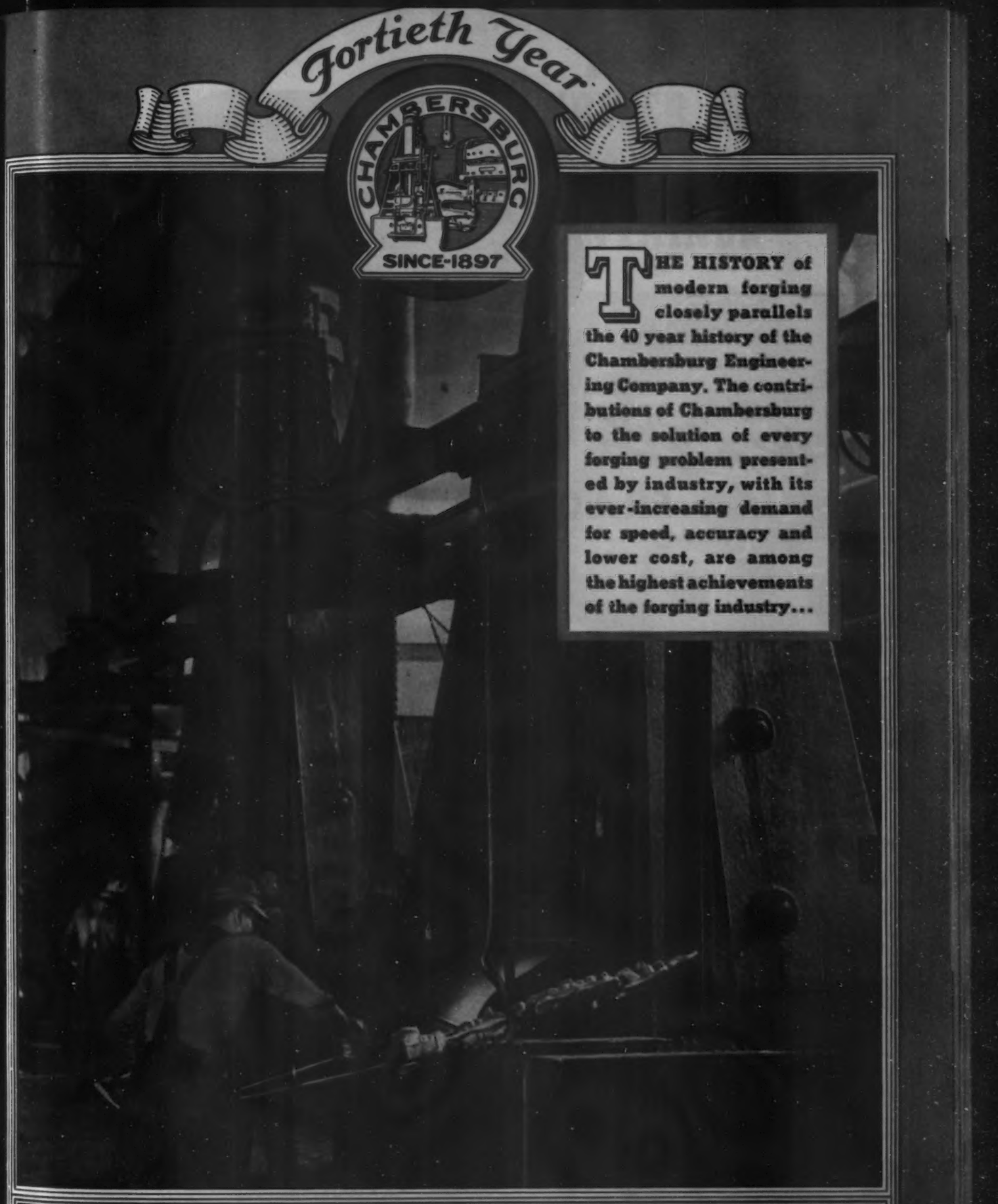
Barstow Union High School District, Barstow, Cal., will take bids soon on general contract for one-story vocational shop and other buildings at local high school. Cost about $150,000. E. Charles Parke, Fuller Building, San Bernardino, Cal., is architect.

FOREIGN

Singer Mfg. Co., Ltd., Clydebank, near Glasgow, Scotland, manufacturer of sewing machines and parts, plans addition, comprising several one-story units. Cost close to $500,000 with equipment.

Japanese South Sea Industrial Co., Tokyo, Japan, plans new cement mill on one of Japanese mandated islands, near Palao Island, where lime rock for raw material supply will be secured. It will include power house, pumping station and other mechanical divisions. Cost over $1,000,000 with machinery.

British Oxygen Co., Ltd., Thames House, London, England, has acquired property at Curdwith, England, for new plant for production of industrial oxygen, acetylene gas and allied products. Cost close to $850,000 with equipment.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MAKING boxes involves making quick contact between headquarters and factory for the Inland Container Corporation.

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BEETLE PRODUCTS DIVISION OF AMERICAN CYANAMID & CHEMICAL COMPANY
BERRY BROTHERS, INC.
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COHAN EPNER COMPANY, INC.
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MACFARLAND MANUFACTURING COMPANY, INC.
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TITANIUM ALLOY MANUFACTURING COMPANY
THE TORRINGTON MANUFACTURING COMPANY
VEEDER-ROOT, INC.

See the specially assembled plastics in connection with new developments.

METALS AND PLASTICS BUREAU

International Bldg.
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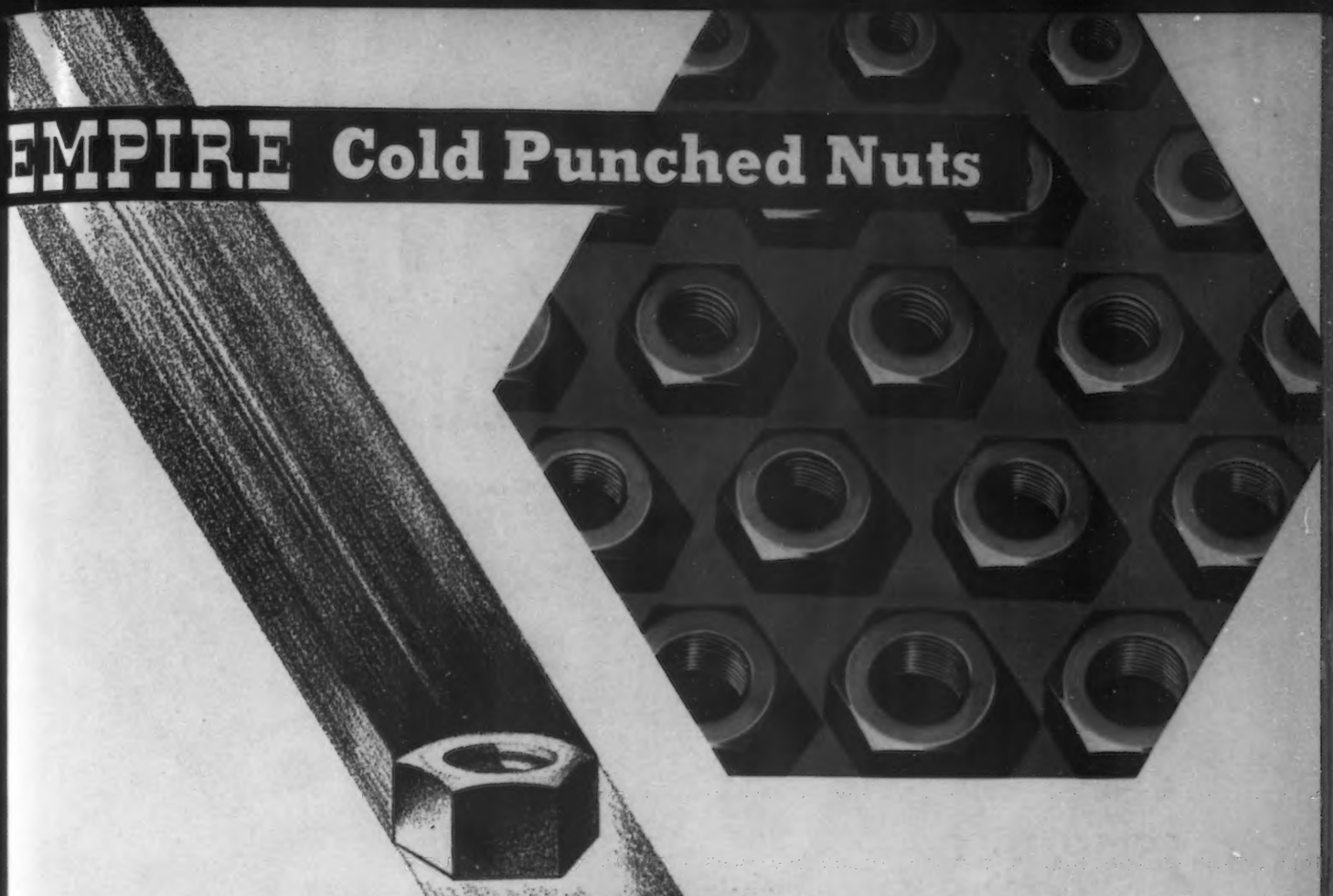
630 Fifth Avenue
New York City

Division of Metal Products Exhibits, Inc.

EMPIRE Cold Punched Nuts



A HARD NUT TO CRACK..OR STRIP

Typical of the excellence of all R B & W products is the EMPIRE Cold Punched Nut—the ultimate in strength, accuracy and finish.

R B & W EMPIRE Cold Punched Nuts are produced by skilled operators on special machinery, not duplicated or equalled elsewhere. Punching is done at right angles to the flow of the steel which eliminates danger of splitting and stripping, the nuts are also re-punched, an exclusive R B & W process centralizing and finishing the hole. Tapping, by a principle developed by our engineers, then gives precise accuracy in lead and pitch. Burnishing, which was also originated by R B & W, hardens the surface for maximum resistance to wrench abuse and produces the final outstanding EMPIRE finish.

Behind every R B & W product stands nearly a century of active, progressive development . . . in selection and treatment of raw stock—in manufacturing methods—in complete service to the buyer.

BOLTS EMPIRE NUTS-RIVETS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY

MODERN PRODUCTION

A PLANT can be no more up-to-date than the products it turns out. Truly modern production means the manufacture of high-quality products to current standards of strength and accuracy, backed by a service that meets today's demands for on-time deliveries of a wide range of stocks.

The position of R B & W as one of the world's largest and oldest manufacturers of bolts, nuts and rivets enables the purchase of the best of raw materials to individual specifications, to create and employ the most advanced manufacturing methods, to carry the most complete stocks, and to fill all orders with utmost promptness.

These are the factors which have established R B & W as the leader in truly modern production of the finest industrial fastenings—that have made the name EMPIRE known the world over.

BOLTS
Carriage • Machine • Lag • Plow
Stove • Elevator • Step • Tap
Wire Wheel & Rim • Battery
U-Bolts • Semi-Finished
Automotive Replacement

NUTS
Cold Punched • Semi-Finished
Hot Pressed • Case Hardened
Slotted • Castle

PINS
Clevis • Hinge

RIVETS
Standard
Tinners' • Coopers' • Culvert

SCREWS
Cap • Machine • Hanger

WASHERS
Plate • Burrs

MATERIALS
Alloys
Steels • Non-ferrous Metals

RODS
Stove • Seat • Ladder

PLATED PARTS
Cadmium • Zinc • Chromium
Nickel • Hot Galvanized • Copper
Tin

SPECIAL UPSET AND PUNCHED PRODUCTS

RUSSELL, BURDSALL & WARD
BOLT AND NUT COMPANY
PORT CHESTER, N. Y. ROCK FALLS, ILL. CORAOPOLIS, PA.
SALES OFFICES
CHICAGO DETROIT PHILADELPHIA DENVER SAN FRANCISCO LOS ANGELES SEATTLE PORTLAND

Every Foot Quickly Available and at Lowest Cost

Paper storage bay in plant of Owens-Illinois Glass Co., Gas City, Ind., served by Whiting 5-ton Tiger traveling crane. Note excellent lighting by means of special glass blocks manufactured by Owens-Illinois Co. (The Austin Co., Cleveland, Ohio, Builders.)

WHITING Tiger CRANE

Every square foot of floor area in this modern storage bay is quickly available and at lowest cost because of the Tiger overhead crane with motor-operated special grapple controlled by crane operator from the cage. The crane man quickly spots and delivers any particular stock desired.

Here, as in so many other material-handling jobs, the Tiger crane supplies efficient, dependable overhead transportation — the kind of transportation every modern plant should have for profitable production. Because it also operates at low cost, the Tiger crane is the answer to many industrial handling problems. Let us show you how a Tiger crane can help you earn greater profits.

SEND FOR CATALOG 300

WHITING CORPORATION • 15601 Lathrop Avenue • Harvey, Illinois

Electric Traveling Cranes
Foundry Equipment
Railroad Equipment
Pulverized Coal Machinery
Stokers—Special Machinery

WHITING

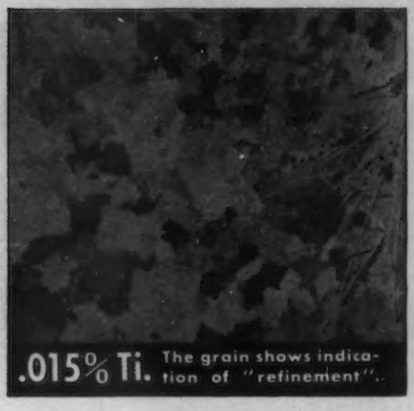
PIONEERS SINCE 1884

CHANCE

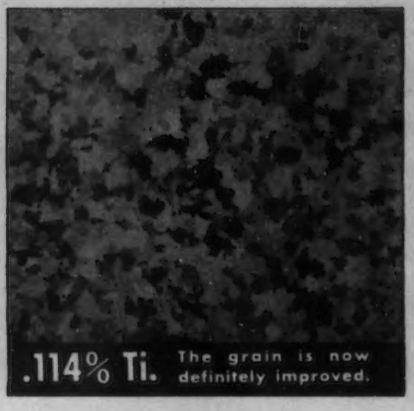
takes a back seat at

GRAIN CONTROL

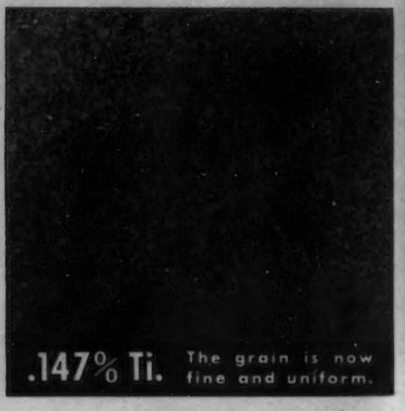
Controlling both the size and the pattern of the grain in metals has long been the ambition of metallurgy . . . for upon the grain structure depends to so great a degree the potential usefulness of the metal. TAM Metallurgical Alloys, backed by TAM Research, today present ways and means of influencing metallic microstructures.



.015% Ti. The grain shows indication of "refinement".



.114% Ti. The grain is now definitely improved.



.147% Ti. The grain is now fine and uniform.

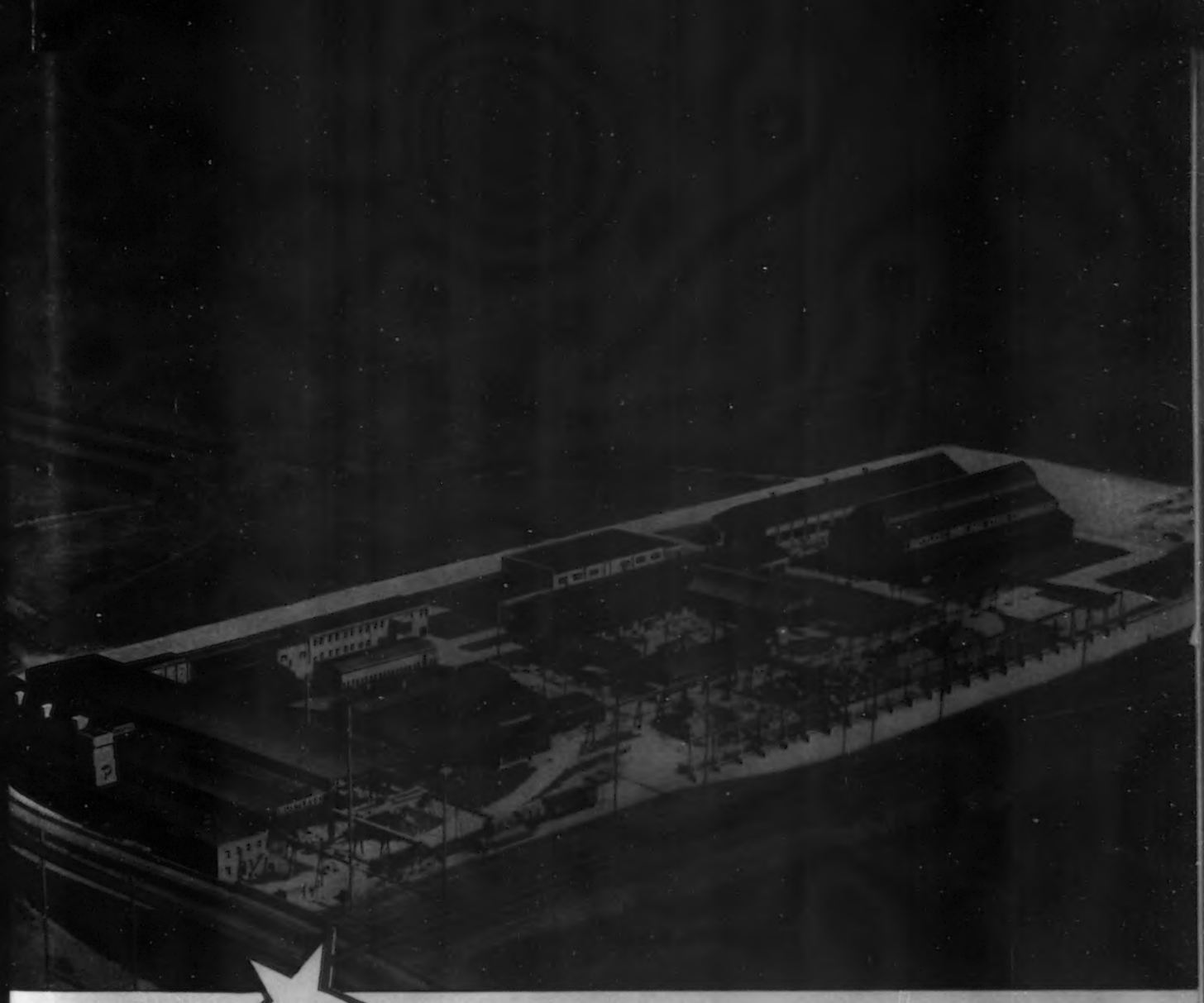
The photomicrographs above are a case study of one particular type of metal (cast aluminum) improved by the addition of a Titanium alloy. Note the progressive "closing in" or refinement of the grain as more Titanium is added. Observe the ideal uniformity of grain structure in the cross-section to the right. In addition to this effect, Titanium is valuable for its cleansing properties—the removal of slag inclusions and other "dirtiness". * * * Why not consider Titanium in *your* efforts to produce a better metal? Learn how a Titanium compound, properly alloyed with your present metal (ferrous or non-ferrous) can effect important changes in physical properties. * * * TAM *Quality Improving* Alloys include such widely accepted ladle additions as TAM *Original* FCT (Ferro Carbon-Titanium) No. 78 for medium and high carbon steels; TAM *Medium Carbon* FCT No. 35 for low carbon steels; TAM *High Aluminum* FCT for forging steels; TAM Foundry Ferro-Titanium for gray cast iron, plus many others. * * * A TAM Engineer, supported by TAM Research will gladly call and discuss the adaptability of TAM Metallurgical Alloys to your product.

THE TITANIUM ALLOY MANUFACTURING CO.

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Resident TAM Development Engineers: Niagara Falls, New York City, Newark, Cleveland, Chicago, St. Louis, Bethlehem . . . *Sales Representation and Warehouse Stocks:* South Central and Pacific Coast States (U. S.), Canada, Europe.

TAM *Better performance through better metals*



For RUSTLESS Customers

This new Rustless mill—the most modern in the industry—was built for Rustless Customers. The doubled production capacity expresses itself not only in increased tonnage, but in expanded service.

From the beginning, Rustless Iron and Steel Corporation has concentrated exclusively on the one job of making finer stainless steel.

The new mill represents the triumph of this idea, and the means of continuing it. The quality and uniformity that have made "same as last order" a complete customer specification... the "as promised" deliveries that meet production needs... are assured to present customers, made available to a wider field of stainless steel users.

RUSTLESS IRON AND STEEL CORPORATION · BALTIMORE, MARYLAND

RUSTLESS

RUSTLESS IRON AND STEEL CORP. SELECTS AETNA-STANDARD DRAWBENCHES FOR DRAWING STAINLESS STEEL

ANOTHER MODERN MILL IS ADDED
TO THE GROWING LIST OF OUT
STANDING STEEL PRODUCERS THAT
ARE USING AETNA-STANDARD DRAW
BENCHES RANGING IN SIZE FROM
FIVE TO ONE HUNDRED AND FIFTY
TONS CAPACITY.

THE AETNA-STANDARD ENGINEERING COMPANY

CONSULTANTS · DESIGNERS · BUILDERS

STEEL AND NONFERROUS INDUSTRIES

YOUNGSTOWN « OHIO » U. S. A.

MACKLIN
Grinding Wheels

SNAGGING RUSTLESS IRON BILLETS

In the new modern mill of the Rustless Iron & Steel Corporation Macklin Wheels will be found on the job. They cut cool and fast and give long life. "Protect Your Production" with Macklin Grinding Wheels.

MACKLIN COMPANY

Manufacturers of Grinding Wheels

JACKSON, MICHIGAN, U. S. A.

Sales Offices:—Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

In the
NORTON ABRASIVES

Cleaning Room, also

EFFICIENCY IS PARAMOUNT AT RUSTLESS IRON AND STEEL CORPORATION

For Billet Grinding Operations

... ALUNDUM WHEELS

MODERN—that's the keynote of the newly enlarged plant of Rustless Iron and Steel Corporation, Baltimore. The cleaning room is no exception. It is up-to-date in layout, with an effective dust exhaust system and vibration-free work benches. And to complete its efficiency Norton Wheels are used on both the swing frame and portable grinders.

They have found by experience that wheels of hard, tough Alundum abrasive (resinoid and rubber bonded) have just the cutting action required for quickly and economically cleaning the billets of stainless steel. On *your* billet grinding jobs, too, Norton Wheels can show cost-saving results. Let a Norton engineer make recommendations.

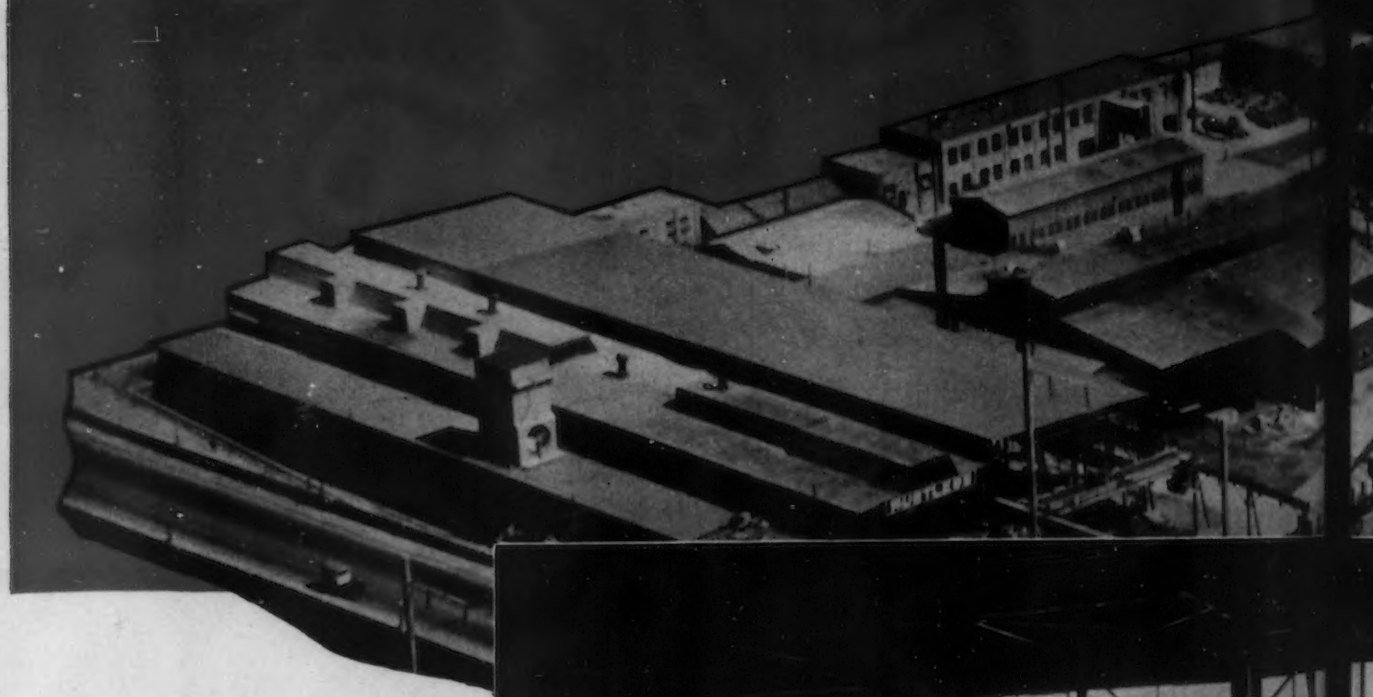
NORTON COMPANY, WORCESTER, MASS.

New York Chicago Detroit Philadelphia Pittsburgh
Hartford Cleveland Hamilton, Ont. London Paris
Wesseling, Germany Corsico, Italy

W-618

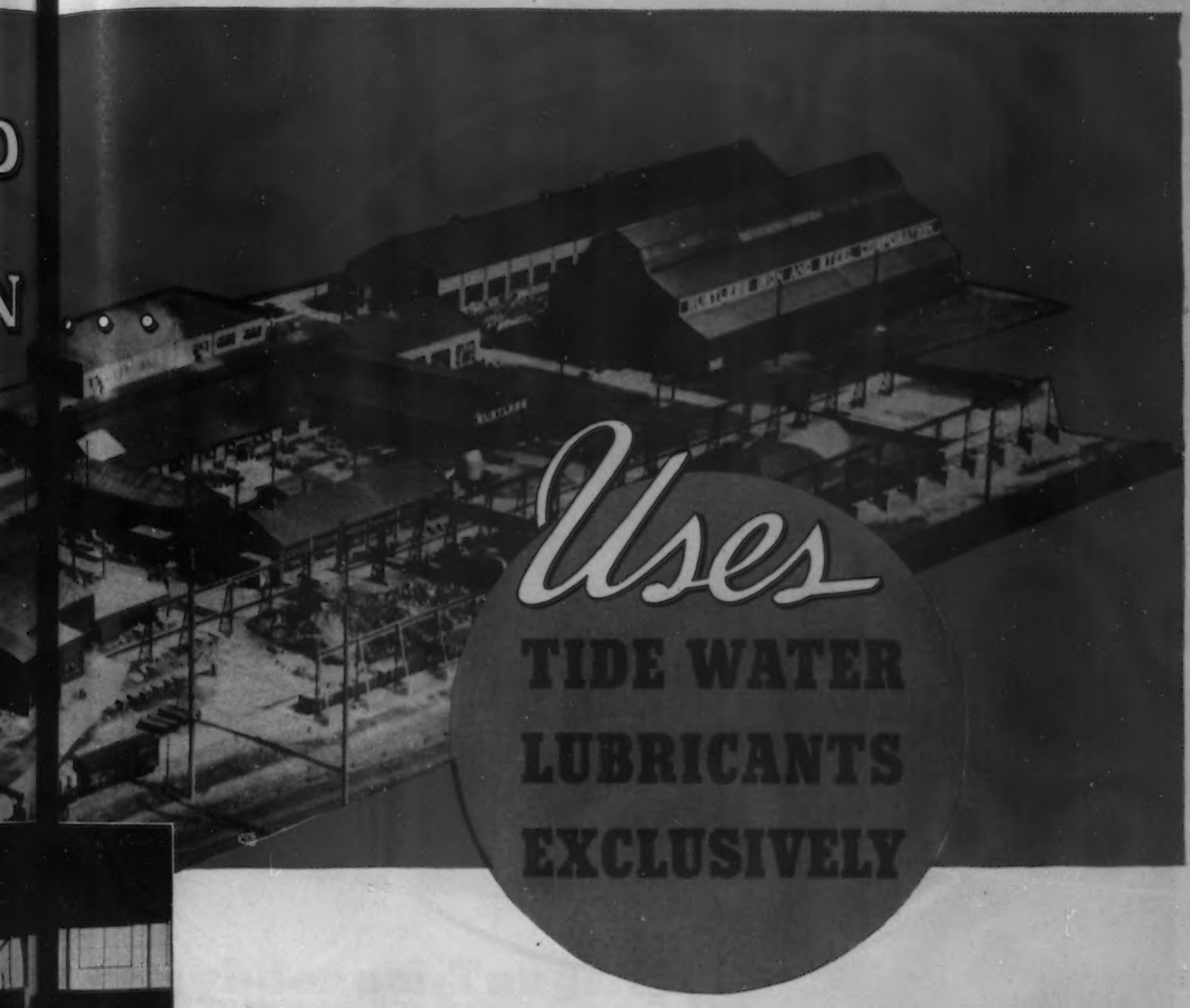
NORTON ABRASIVES

RUSTLESS IRON AND STEEL CORPORATION



INDUSTRIAL TYCOL OILS-GREASES

THERE IS A COMPLETE LINE OF TYCOL LUBRICANTS



Uses TIDE WATER LUBRICANTS EXCLUSIVELY

Rustless Iron and Steel Corporation, producers or stainless steels, have never had a shut-down due to lubrication troubles — since Tycol lubricants were adopted exclusively. Today, production is five times as great as it was three years ago. Throughout this phenomenal growth Tide Water has rendered the type of service for which it is known throughout industry — lubrication which is engineered to fit each and every specific job.

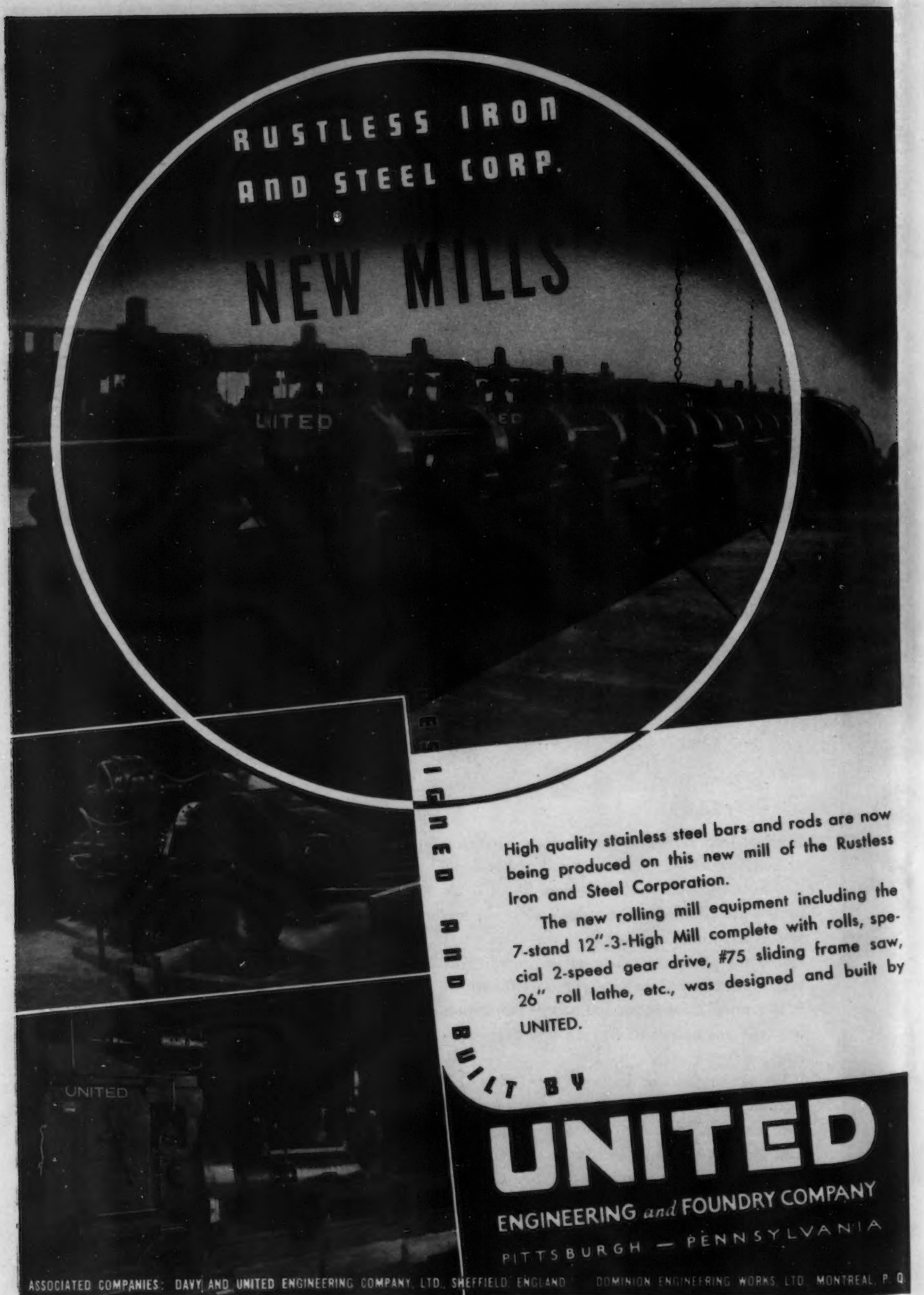
In every branch of industry Tycol Oils and Greases enjoy the rewards which only performance assures. Such contributions as Tycol Green Cast Greases, which assure the maximum lubrication per pound... Roll Neck Block Greases, which made more efficient the lubrication of plain bearing roll necks... Edeleanu solvent-refined Turbine and Diesel Oils, which assure maximum lubrication efficiency—these, and many more, are part of the complete line of Tycol lubricants scientifically engineered for every industrial use.

Get in touch with the nearest Tide Water representative. Take full advantage of his specialized engineering knowledge and the performance-proved lubricants with which Tide Water serves industry.

•

TIDE WATER ASSOCIATED OIL COMPANY
TIDE WATER DIVISION
17 Battery Place, New York, N. Y.

SCIENTIFICALLY ENGINEERED FOR EVERY INDUSTRIAL USE



ENGINEERED AND BUILT BY

High quality stainless steel bars and rods are now being produced on this new mill of the Rustless Iron and Steel Corporation.

The new rolling mill equipment including the 7-stand 12"-3-High Mill complete with rolls, special 2-speed gear drive, #75 sliding frame saw, 26" roll lathe, etc., was designed and built by UNITED.

UNITED
ENGINEERING and FOUNDRY COMPANY
PITTSBURGH — PENNSYLVANIA

ASSOCIATED COMPANIES: DAVY AND UNITED ENGINEERING COMPANY, LTD., SHEFFIELD, ENGLAND — DOMINION ENGINEERING WORKS, LTD., MONTREAL, P. Q.

Molybdenum-Tungsten High Speed Steel

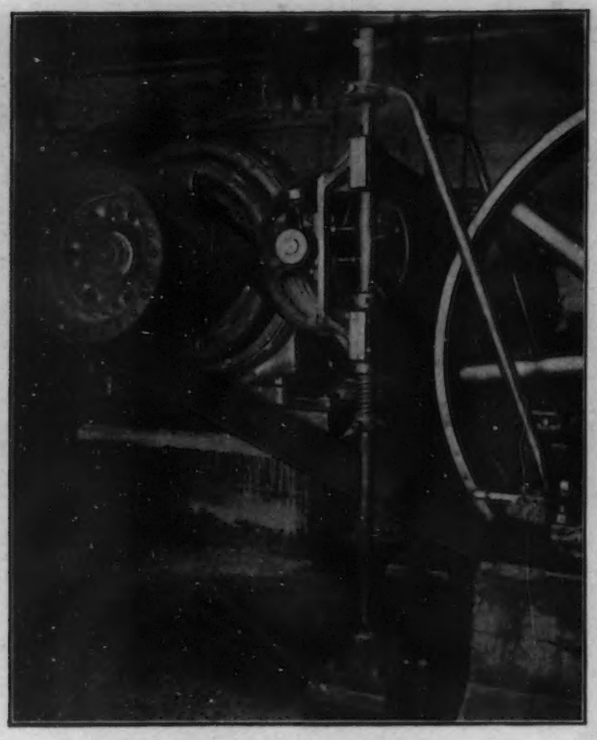
A balanced alloy of four powerful elements challenges all comparable high speed steels for the banner of quality. Year after year of ever broadening acceptance and use shows that Molybdenum-Tungsten high speed steel is the best answer to the most severe production requirements.

It is commercially established.
Mill stocks are ample.
Thousands of tons of it have been made and used.
Millions of tools are now in service.
Think how much its superior performance can save you!

Leading steel companies in North America and Europe are now licensed to make MO-MAX. A booklet giving the essential data may be obtained by addressing The Cleveland Twist Drill Company, Cleveland, Ohio.

SHIFT TO MO-MAX FOR QUALITY AND QUANTITY PRODUCTION

*MO-MAX is a proprietary name owned and controlled by The Cleveland Twist Drill Company and its only licensed use by others is on steel made and sold by licensees under U. S. Patent Nos. 1,937,334; 1,998,953; 1,998,954; 1,998,955; 1,998,956; 1,998,957; and Canadian Patent Nos. 346,506; 364,032 and 364,033. 7789A



On *Any* Drive Rhoads TANNATE Leather Belts Give You Longer Service Larger Output and Lower Costs!

THE Rhoads TANNATE Belt shown above has been in steady use for four and one-half years . . . still good . . . still giving excellent trouble-free service. Eighteen months was the usual belt life on this short-center, idler drive before the TANNATE Belt was installed.

But on most short-center drives idlers are discarded when TANNATE Belts are used. Their greater power-transmitting capacity, flexibility and grip are assured by the special processes used in making them.

TANNATE Belts are *not* ordinary belts. They are specifically made to deliver to you more power, longer life, more production and lower maintenance costs. Hundreds of satisfied industrial plants have *proved* these facts. Write TODAY for full information about TANNATE Leather Belting—or, ask to have a Rhoads salesman call!

J. E. RHOADS & SONS

Established 1702

PHILADELPHIA, 35 N. Sixth Street

NEW YORK, 102 Beekman St. ATLANTA, 88 Forsyth St., S. W.
CHICAGO, 26 N. Clinton St. CLEVELAND, 1200 W. Ninth St.

Factory & Tannery, Wilmington, Delaware

THE production of centrifugal castings . . . castings "spun" under pressure to purge them of all oxides and impurities . . . is an important service of Ampco Metal, Inc., to industry.

The greater density, longer life, and cleaner metal resulting from the centrifugal method are its outstanding advantages . . . and Ampco Metal, Inc. has developed the technique of centrifugal casting to provide these advantages in fullest measure.

Centrifugal castings can be had in any size range from one pound to two tons each . . . from small gears and bearings for machine tools to 4,000 pound screw down nuts for the steel industry . . . in either Ampco Metal or Aluminum Bronze.

Utilize the value of centrifugal castings—get complete information from Ampco today.

AMPCO METAL, INC.

Dept. IR4-11 **MILWAUKEE, WIS.**

In some one of its six grades Ampco Metal can very probably solve a problem for you . . . why not check with us?

The book "Ampco Metal—Its Uses in Modern Industry" will interest you; write for a copy.

AMPCO METAL

"The Metal without an Equal"

BEFORE YOU SPECIFY . . . INVESTIGATE AMPCO

The above photos show the Oilgear XS-6, single slide Surface Broaching Machine. Cutting speed 4 to 30 ft. per min. Capacity 9,000 lbs. This machine turns out four core pins, broached at each end with each cutting stroke. Production 1600 per hour.

Right—Operator removing finished core pins.

Left—Shows simple feed and control operations.

Inset—Finished core pin.

OILGEAR *Smooth* POWER—

1. One or more pieces finish-broached simultaneously.
2. Highest production at close tolerances.
3. Each unit complete and self-contained.
4. Single lever, semi-automatic control.
5. Automatic full interlock of broach and shuttle tables.
6. Welded all-steel construction.
7. 6, 10, 16, 20 ton capacities.

MEANS FASTER—BETTER SURFACE BROACHING

Oilgear Surface Broaching Machines are making new production records with every installation. And—this is not at all surprising when you consider that it is the *one* Surface Broaching Machine that embodies the famous Oilgear Variable Delivery Pump. Therefore, the only Surface Broaching Machine that can give you flexible, smooth power under perfect control. Because of its absolute safety, incomparable accuracy and dependability under all shop conditions, Oilgear is the choice of experienced plant operators the world over. Records show that only Oilgear is capable of continuous high production at remarkably close tolerances at an almost negligible maintenance cost. Think what Oilgear would mean to your shop. The Oilgear Bulletin 23,000A will give you complete information. Write for it. THE OILGEAR COMPANY, 1303 W. Bruce St., Milwaukee, Wis.

OILGEAR SURFACE BROACHING MACHINES

All Cats ARE GRAY IN THE DARK

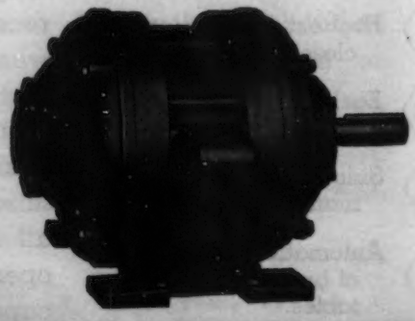
. . . but most motors look alike even in daylight. However, there are as great differences in the sturdiness of motors as there are in the color of cats. It is sturdiness that prolongs the life of a motor and reduces maintenance costs and Allis-Chalmers Motors are the sturdiest motors on the market—bar none.

Do you want to prove this to yourself?

Then don't just compare dimensions and electrical characteristics, for they are identical in most motors; prices are also about the same. It is the workmanship, the materials and the construction of motors that you should examine carefully, critically, before purchasing.

Careful examination of Allis-Chalmers Motors will reveal: ample insulation, with a big margin added for mechanical durability . . . studied use of steel throughout . . . cast steel frames . . . rugged cast iron housings . . . heavy bearing enclosures—that is why they are so sturdy. That is why they are the best motor buy on the market.

For further information write for Bulletin No. 2173.



The Allis-Chalmers Mfg. Co. builds standard motors of every type from 1 hp. up—also motors for special application

746

MOTOR DIVISION

ALLIS-CHALMERS

MILWAUKEE WISCONSIN

"TRIPLE THREAT" METAL

Like a "triple threat" football player, HERCULOY* is tough, strong and versatile.

This unique metal may be exactly the material you are looking for. Its resistance to corrosion is practically equivalent to that of pure copper, yet its tensile strength is comparable to that of mild steel. It is non-magnetic. It resembles gold in appearance, and is capable of taking an excellent finish.

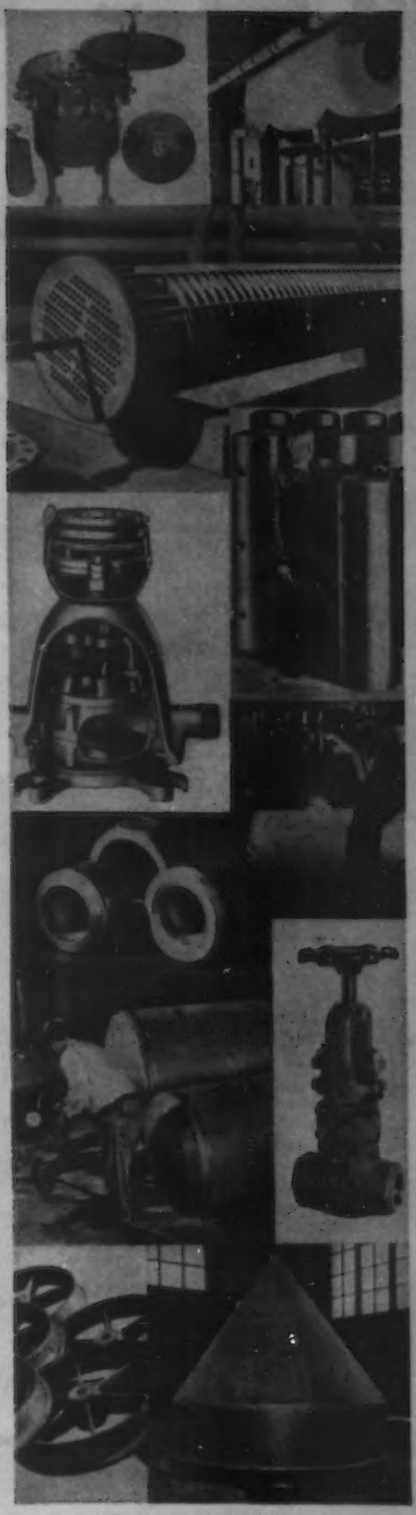
It can be spun, stamped, pressed, drawn, hot and cold forged, welded and machined. It comes in sheets, plates, rolls, strips, rod, bar, shafting, tube and welding rod.

It can be furnished in a variety of alloys with definitely controlled characteristics of ductility, hardness, tensile strength and endurance limit in fatigue.

It is now in use for hundreds of products, parts and purposes subject to many types of service requirements. The accompanying composite picture shows eleven of these diversified applications.

Staff members of Revere Technical Advisory Service are available to help you choose the proper type of Herculoy—or other Revere material—for best performance and economy in your product.

Inquire about this service, which involves no expense or obligation on your part—and ask for the new Revere Herculoy Bulletin, containing complete information with tables and charts showing physical properties. Please address your inquiry to our Executive Offices, 230 Park Avenue, New York City.



** U. S. Patent Nos. 1,868,679; 1,924,581; 2,002,460; 2,009,977 and 2,035,414. Licensed under U. S. Patent Nos. 1,539,260; 1,933,390; 1,936,397 and others.*

Revere Copper *and* Brass

INCORPORATED

FOUNDED BY PAUL REVERE 1801

EXECUTIVE OFFICES: 230 PARK AVENUE, NEW YORK CITY · MILLS: BALTIMORE, MD. · TAUNTON, MASS. NEW BEDFORD, MASS. · ROME, N. Y. · DETROIT, MICH. · CHICAGO, ILL. · SALES OFFICES IN PRINCIPAL CITIES

New Industrial Literature

A REVIEW OF CURRENT CATALOGS AND CIRCULARS • A TIME SAVING SERVICE FOR BUYERS

CORROSION RESISTANT PIPE.—Haveg Corp. Bulletin describes Haveg "41" corrosion resisting pipe, fittings and fume duct which are molded from a mixture of acid-washed asbestos and a synthetic phenol formaldehyde resin which is said to give exceptional resistance to acids, salts, and many other solvents and acids. Pipe and fittings are available in sizes from ½ in. to 12 in.; fume duct in sizes from 2 in. to 30 in. Bulletin 11-1.

BALL BEARINGS.—Nice Ball Bearing Co. Catalog lists over 750 types of ball bearings, including stainless steel, monel metal, bronze and rust-preventive bearings. Also describes casters for industrial service which may be lubricated with a grease gun. Bulletin 11-2.

REPAIRING BY WELDING.—Stulz-Sickles Co. Booklet describes the use of welding for repairing railroad equipment, rebuilding tractor treads and steam shovel dipper teeth, and repairing broken or worn down wobblers and spindles on rolling mill equipment. Also discusses the use of Manganal for welding 11 to 13½ per cent manganese steel castings. Bulletin 11-3.

FLOW CONTROL VALVES.—Hancock Valve division, Manning, Maxwell & Moore, Inc. Bulletin covers the redesigned Hancock Flocontrol valve which is equipped with a micrometer dial and pointer that enables the operator to set the valve to within one-hundredth of a turn of the handwheel. This device permits accurate control of the volume of steam, liquids and gases which pass through the valve. Bulletin 11-4.

LIFTING MAGNETS AND CONTROLLERS.—Ohio Electric Mfg. Co. Bulletin No. 110 describes lifting magnets and controllers. It is claimed the controller will cause the magnet to drop its load so promptly as to make speeds up to 10 lifts per minute possible. Bulletin 11-5.

UNIVERSAL AND TOOL GRINDER.—Landis Tool Co. Catalog K-137 covers the 12x28 in. universal and tool grinder. With standard equipment the machine is suitable for surface, internal and the usual external cylindrical grinding. Extra equipment makes possible hob grinding, circular forming tool grinding, staggered tooth gear cutter grinding, etc. Complete specifications are included. Bulletin 11-6.

REFRACTORY AND INSULATING MATERIALS.—Johns-Manville Co. New edition of the J-M industrial products catalog which contains information and recommendations on high and low temperature insulations, asbestos built-up roofs, corrugated Transite for roofing and siding, Transite pressure pipe, J-M packings and gaskets and various other industrial products. Bulletin 11-7.

INDUSTRIAL RUBBER TIRES.—B. F. Goodrich Co. The problem of proper application of rubber tires to industrial hauling operations is comprehensively discussed in this handbook. A comparison is made with steel wheels and the features of the various types of rubber tires are pointed out. Included is a description of pneumatic tires for wheelbarrows. Bulletin 11-8.

IGNITION TRANSFORMERS.—Webster Electric Co. Bulletin No. 1.T.5 describes transformers for oil burner service. Construction features are illustrated and complete dimensions are given. Also described is a transformer for use in ignition of gas pilots. Bulletin 11-9.

TURRET LATHES.—Gisholt Machine Co. Catalog devoted to features of company's improved 3AL, 4L and 5L heavy-duty machines, and optional special attachments, mechanical and hydraulic chucks, and standard tool sets. Bulletin 11-10.

CERTIFIED ANALYSIS STEEL.—Joseph T. Ryerson & Son, Inc. This booklet describes a new plan of providing buyers of alloy steel with a report giving the analysis and heat treating characteristics of each bar of steel furnished, thus enabling the user to know in advance how each bar will react to heat treatment. Bulletin 11-11.

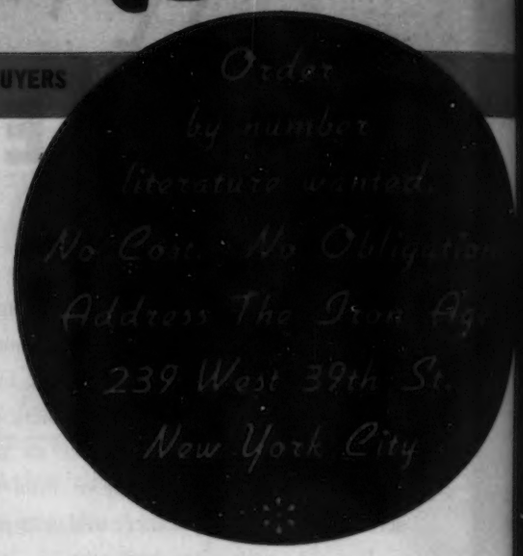
HAND GRINDERS.—The Dumore Co. Bulletin featuring large and small hand grinders with universal motors. Specifications are included as well as photographs of the grinders in use. Bulletin also contains cross sections, specifications and prices for mounted wheels and points. Bulletin 11-12.

PORTABLE PLATER.—Nickel - Chromium Folder illustrating and describing Connecticut portable plating machines for refinishing golf clubs, showers, electric fixtures, etc. Prices are included. Bulletin 11-13.

INDUSTRIAL LUBRICATION.—Standard Oil Co. of Indiana. Bulletin describing lubrication methods incidental to reducing coal handling costs through better lubrication of conveying and handling equipment, preparation equipment and stokers. Bulletin 11-14.

STEEL CONTAINERS.—Pressed Steel Tank Co. Catalog covering seamless steel cylinders, tanks, bells, drums and special shapes. Manufacturing processes and products are illustrated and descriptive text, specifications and cross sectional drawings are included. Bulletin 11-15.

CONVEYORS.—Standard Conveyor Co. Catalog illustrating and describing various types of material handling equipment and containing many actual photographs of installations with lists of users. Bulletin 11-16.



DEGREASING MACHINE.—G. S. Blakeslee & Co. Bulletin describing the dual vapor control degreasing process and illustrating equipment. Includes list of applications. Bulletin 11-17.

ROLLER CONVEYOR.—Mathews Conveyor Co. Bulletin explaining and illustrating by means of photographs, blue prints and cross sections, shock absorbing resiliently mounted roller conveyors. Bulletin 11-18.

RAILROAD SCALE RECORDERS.—Streeter-Amet Co. Folder containing statistical data comparing costs of hand weighing and automatic motion weighing as is possible with railway track scale recorders. Bulletin 11-19.

METAL CUTTING MACHINE.—Rasmussen Machine Co., Inc. Automatic metal cutting machine described and features discussed in bulletin containing illustrations, specifications and details of construction. Bulletin 11-20.

SINTERED CARBIDE TOOLS.—Firth-Sterling Steel Co. Folder showing different standard and non-standard Firthite tools and tips. Engineering drawings are included, as well as useful data such as symbols for specifying angles, rakes, clearances, radius and the like. Bulletin 11-21.

WIRE AIRCRAFT PRODUCTS.—John A. Roebling's Sons Co. Booklet A-832 describes and illustrates aircraft control cords, terminals, steel ferrules, ignition cables and various other aircraft products manufactured by the company. Bulletin 11-22.

BERYLLIUM COPPER.—Riverside Metal Co. Booklet discussing beryllium copper with respect to its properties, workability and application. Numerous photographs illustrate actual applications. Material is non-sparking. Bulletin 11-23.

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Wherever there are "sand storms" . . . in grinding and sand blasting departments for example . . . the ordinary motor is soon cut to death. It is soon eaten up, wherever there are corrosive fumes. At such deadly work, a Fairbanks-Morse enclosed fan-cooled motor will live . . . long and economically.

The F-M enclosed fan-cooled motor is far more than an ordinary motor with a dust-tight case. From the base up, it is designed for exacting service. Fortified by a vault-like case which dust and fumes do not penetrate, it is ventilated and positively cooled by fans at each end of the shaft. Ball bearings reduce friction to the vanishing point, and bearings need lubrication only once a year. These and many other protective features are incorporated within a size no larger than a regular open-frame motor.

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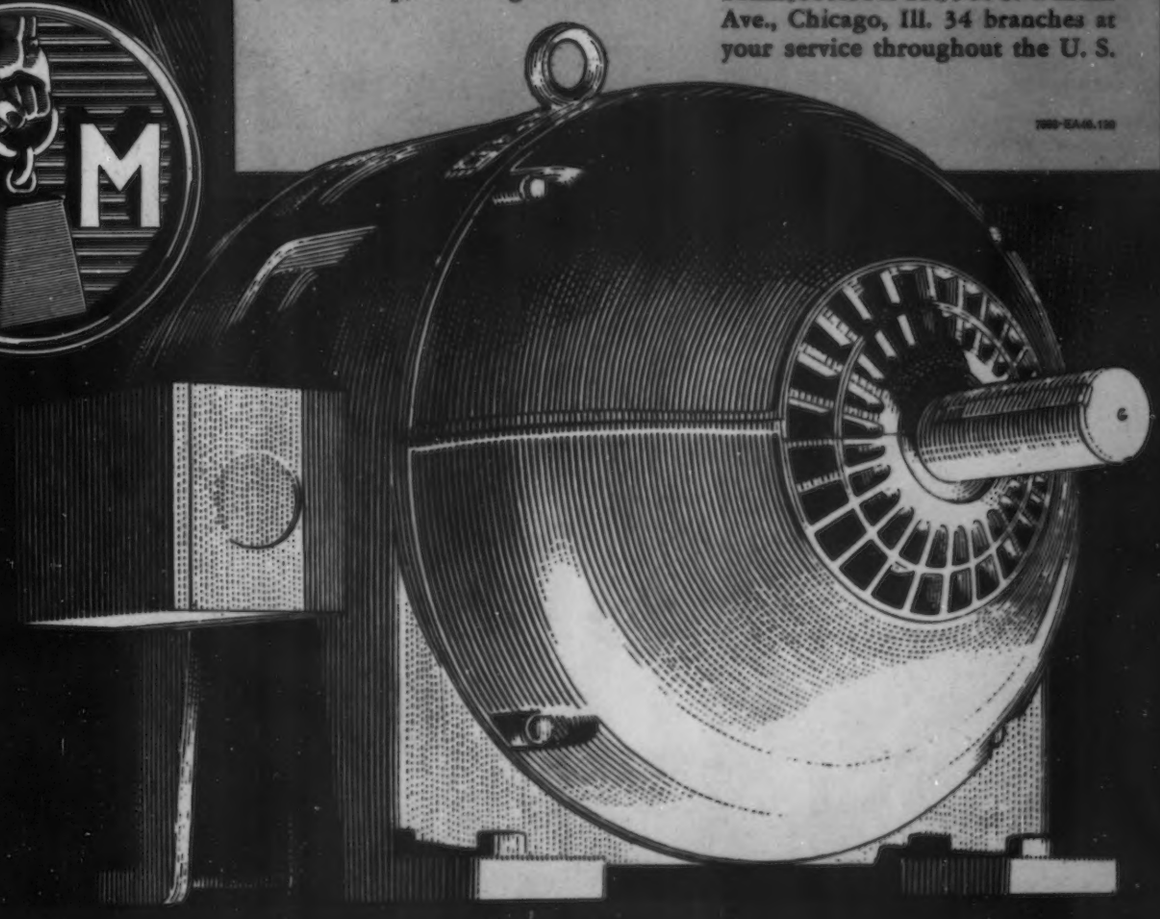

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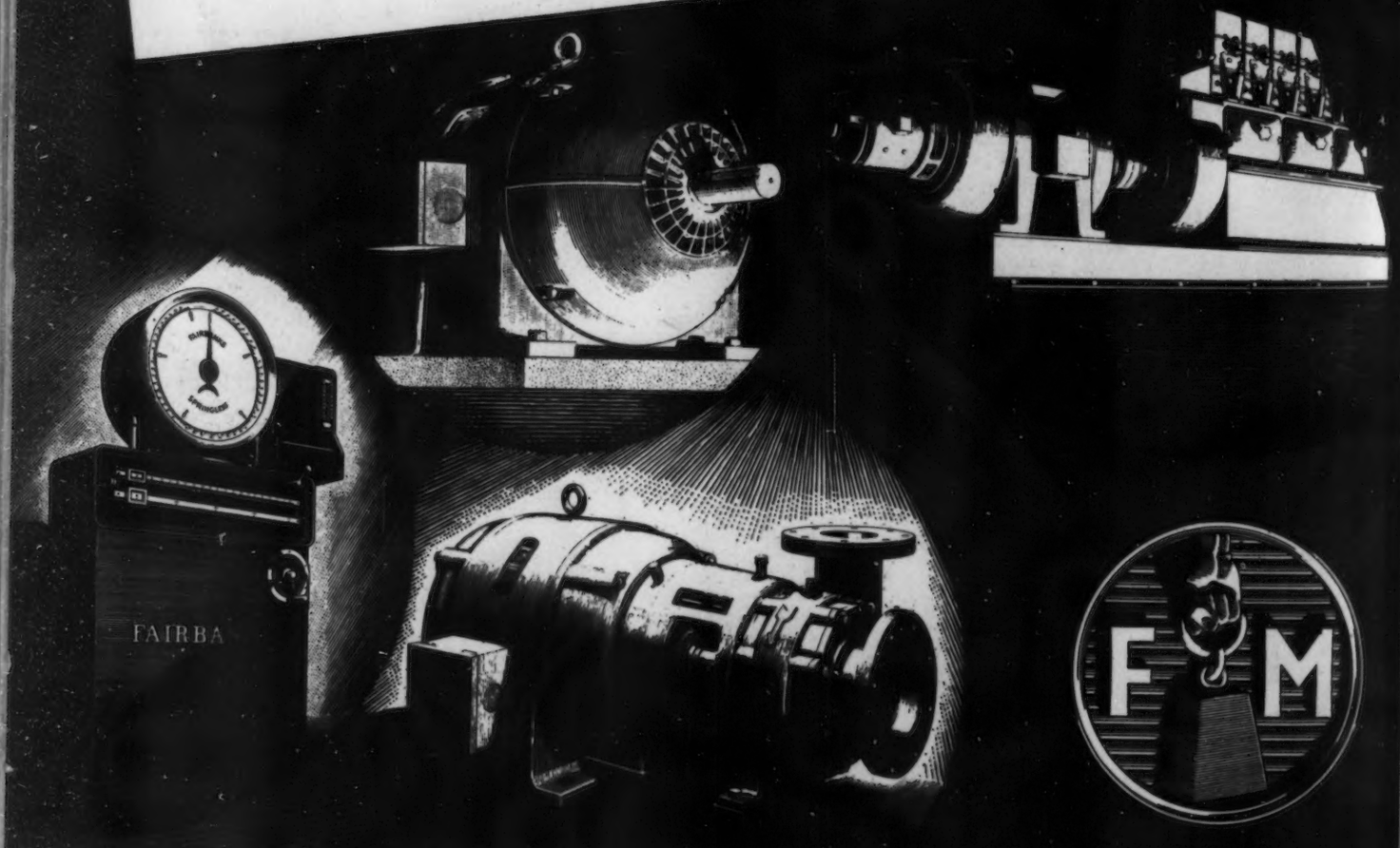

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It took over two years of intensive research and development work; and an investment of $250,000 in new laboratory equipment to produce Socket Screws good enough to uphold the Parker-Kalon reputation. When you get samples of the new Parker-Kalon Cold-forged Socket Screws, you will agree that the result fully justifies the expenditure of effort and money. Judged by any standard, these new Screws will measure up to your ideas of what good Socket Screws should be. Send for bulletin that gives full details and free samples of the types and sizes you use.

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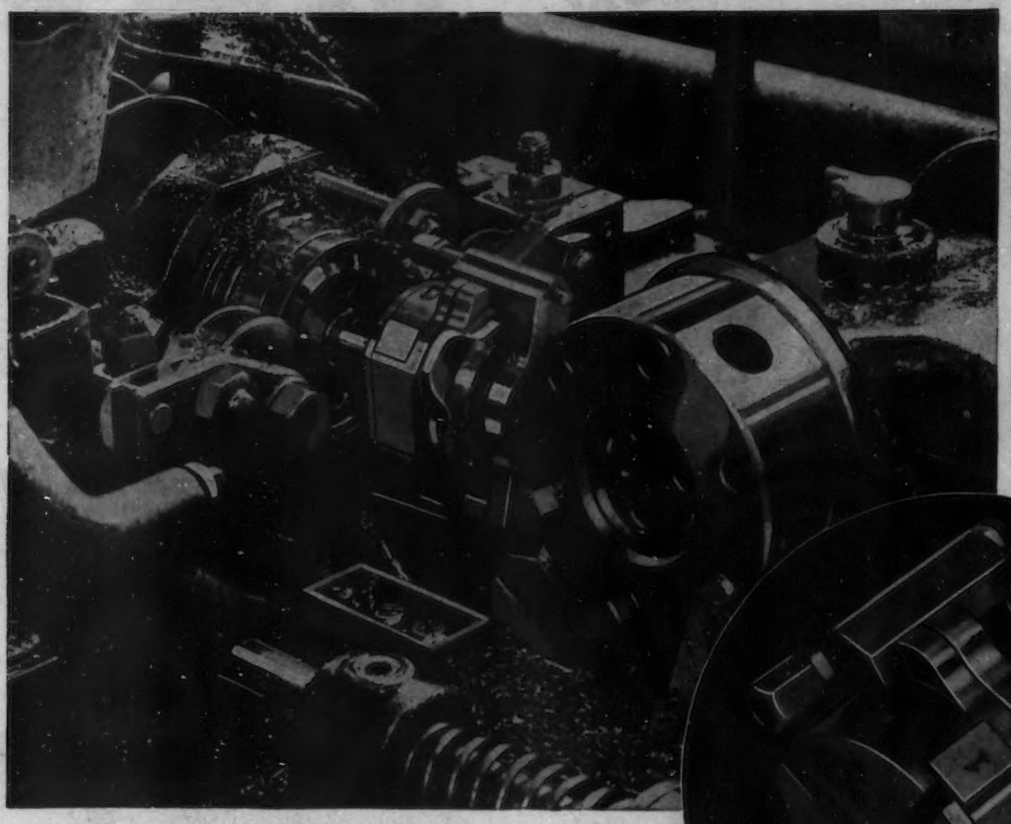


A REAL RECORD

Cold-Rolled Steel Screw: No. 10-32 Thread, ⅝ ins. long, threaded with H&G Insert Die Head on a No. 00 Brown & Sharpe Automatic.

Threading Speed of 2,750 revolutions per minute; previously 927 r. p. m.

Production of 1,000 pieces per hour with runs of 50M to 100M made before grinding. Previously runs of only 3,000 were obtained.

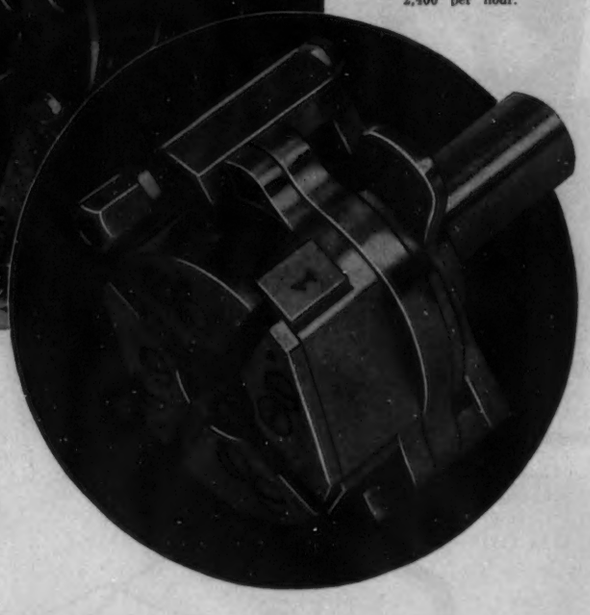
ANOTHER ONE

Brass Pieces: Threaded with H&G Insert Die Head on a No. 00 Brown & Sharpe Automatic at a threading speed of 6,000 revolutions per minute.

Thread Form: 4-40 American National.

Time: One and one-half seconds; 2,400 per hour.

H&G Insert Chaser Die Head—Style DM—on a No. 00 Brown & Sharpe Automatic clicking off threaded pieces at the rate of a thousand an hour—about three times better than the best previous record.



H&G INSERT CHASER DIE HEADS *bring you*

SIMPLIFIED THREADING *at Lower Costs*

H&G insert chasers last two to three times longer before getting dull and cost only a fraction of the price of the conventional type. These chasers can be thrown away when dull, making it possible to always use new chasers; or, they may be inexpensively reground if desirable.

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—REDUCES inventory

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—REDUCES chaser cost per thousand pieces.

Style DM Insert Chaser Die Heads are available for each size of Brown & Sharpe Automatic and will thread up to full capacity of these machines.

There are H&G Insert Chaser Die Heads for most all machines.

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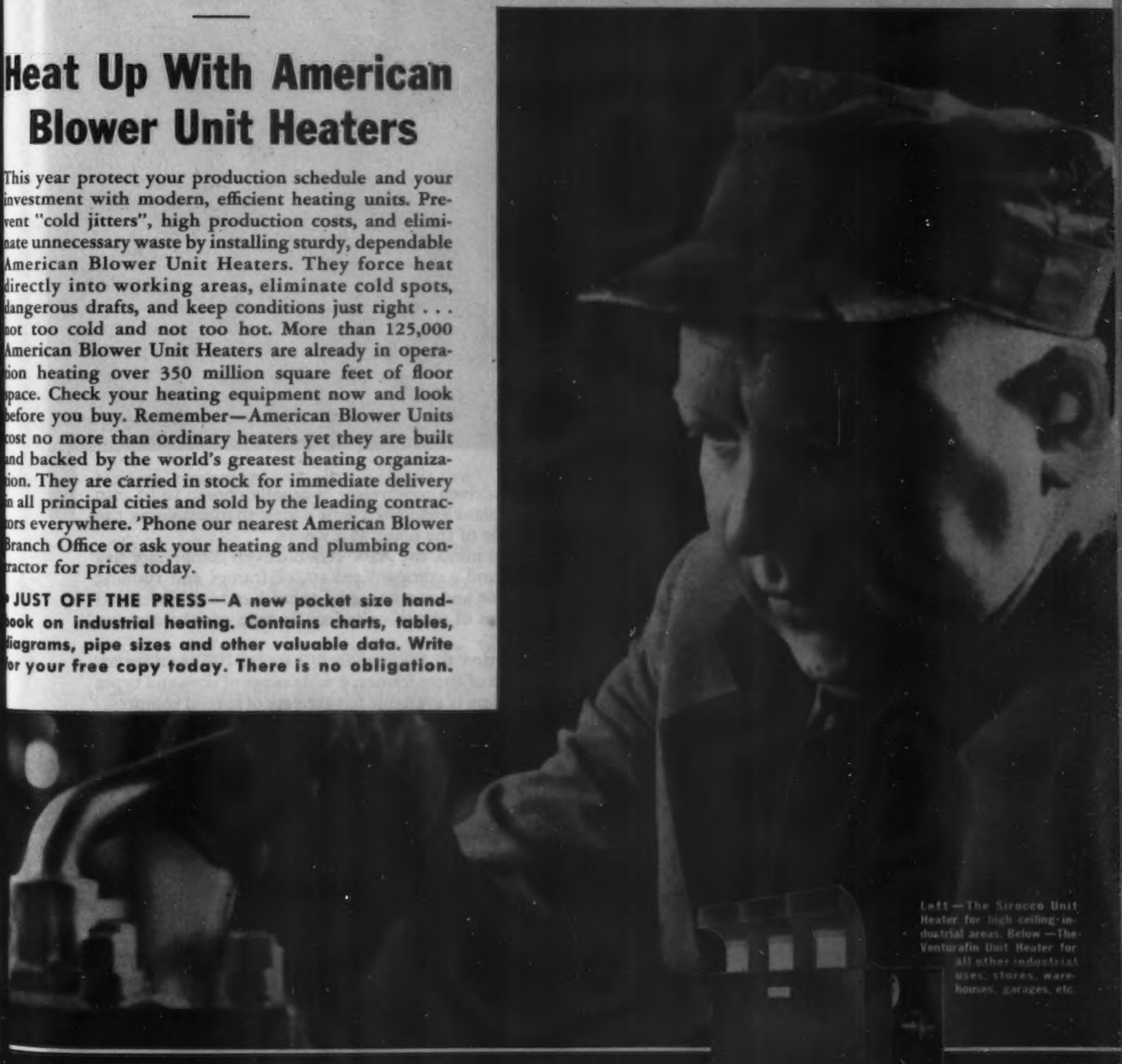

Left—The Sirocco Unit Heater for high ceiling industrial areas. Below—The Venturafin Unit Heater for all other industrial uses, stores, warehouses, garages, etc.

AMERICAN BLOWER
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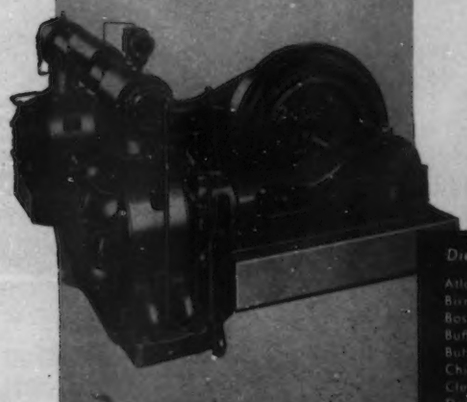
COMPRESSORS BUILT TO YOUR ORDER
From a Wide Range of Standardized Parts

A 1200 hp. steam-driven XPV two-stage compressor, pumping illuminating gas.

The belted and direct-connected electric-driven compressors shown above and below are also part of the I-R line of more than 1000 sizes and types of compressors, vacuum pumps and blowers ranging from 1/4 to 12000 hp.



TODAY, a steam-driven compressor is usually chosen to fit into existing steam-plant conditions with a view to maintaining the proper steam balance of the plant as a whole.

With this trend in mind, the XPV steam-driven compressor has been developed around a standardized set of frames and running gears. For each frame and running gear there has been developed a wide range of sizes of steam cylinders to take care of varying requirements.

Likewise, in addition to the standard 2-stage, 100-pound compressing end for each of these frames, a wide range of sizes and types of compressor cylinders is available to take care of special compressing problems—for handling air, synthetic, poisonous or inflammable gases, for vacuums, and for pressures up to 5000 lbs. There is also a complete line of ammonia cylinders, which make these machines particularly adaptable to the wide range of pressure conditions encountered in industrial applications.

The XPV is noted for its "four corner" construction affording maximum accessibility, and for its piston-valve steam end with automatic cut-off. The latter provides maximum economy under varying steam and load conditions. Double-crosshead and tie-rod construction gives straight-line drive from steam to compressor ends. Compressor cylinders are equipped with the efficient, quiet and durable Channel Valves. Each of these distinctive features was pioneered by Ingersoll-Rand.

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· USE LANDIS GRINDERS ·

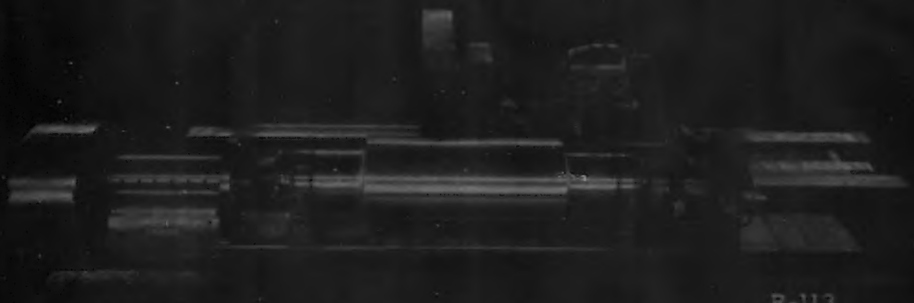
An EXCELLENT VIEW

R-113

Obviously it is not possible for us to promote your interest in Landis Type 30 Roll Grinders by placing one on your desk for inspection. An alternative is the photographic presentation on this page.

This view of a Landis 60" x 312" Type 30 Roll Grinder is a good one. It shows in miniature just what you would see if you were right out in the mill where it is used. Unfortunately we cannot picture the satisfaction of the user of this machine and the many others of like type now in operation.

Our representative is anxious to tell you about this if he is given the opportunity. At the same time, he will discuss with you the reasons why the Landis Type 30 Roll Grinder is the choice of so many mills today. No. 250



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LANDIS TOOL CO.

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Largest size industrial truck battery ever made

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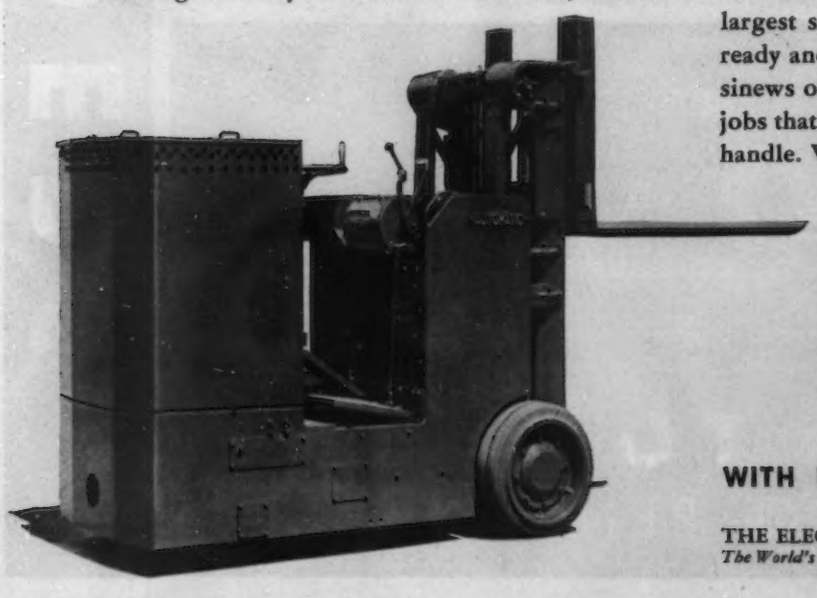
The new *super* Exide-Ironclad, Type FLM-13, has a capacity of 1080 ampere-hours at the normal six hour discharge rate. Yet it requires but 26" x 51" floor space, for it is assembled in a space-saving steel tray. In double-shift service, the steel tray assembly facilitates quick changing of batteries, providing continuous service through the use of duplicate batteries.

With the big trucks of today, and the larger ones planned for tomorrow, this super Exide-Ironclad Battery enormously broadens the useful range of low-cost handling methods. It is the world's largest size battery for electric industrial trucks, ready and able to pour giant power into the steel sinews of these units—the battery for those heavy jobs that some men thought no battery could ever handle. Why not write for full details today?



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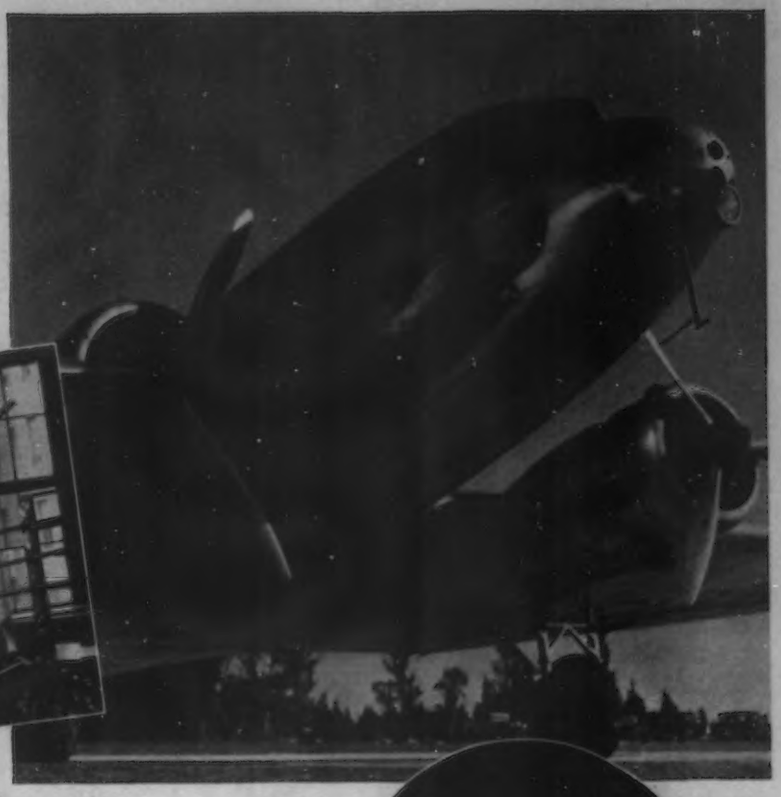

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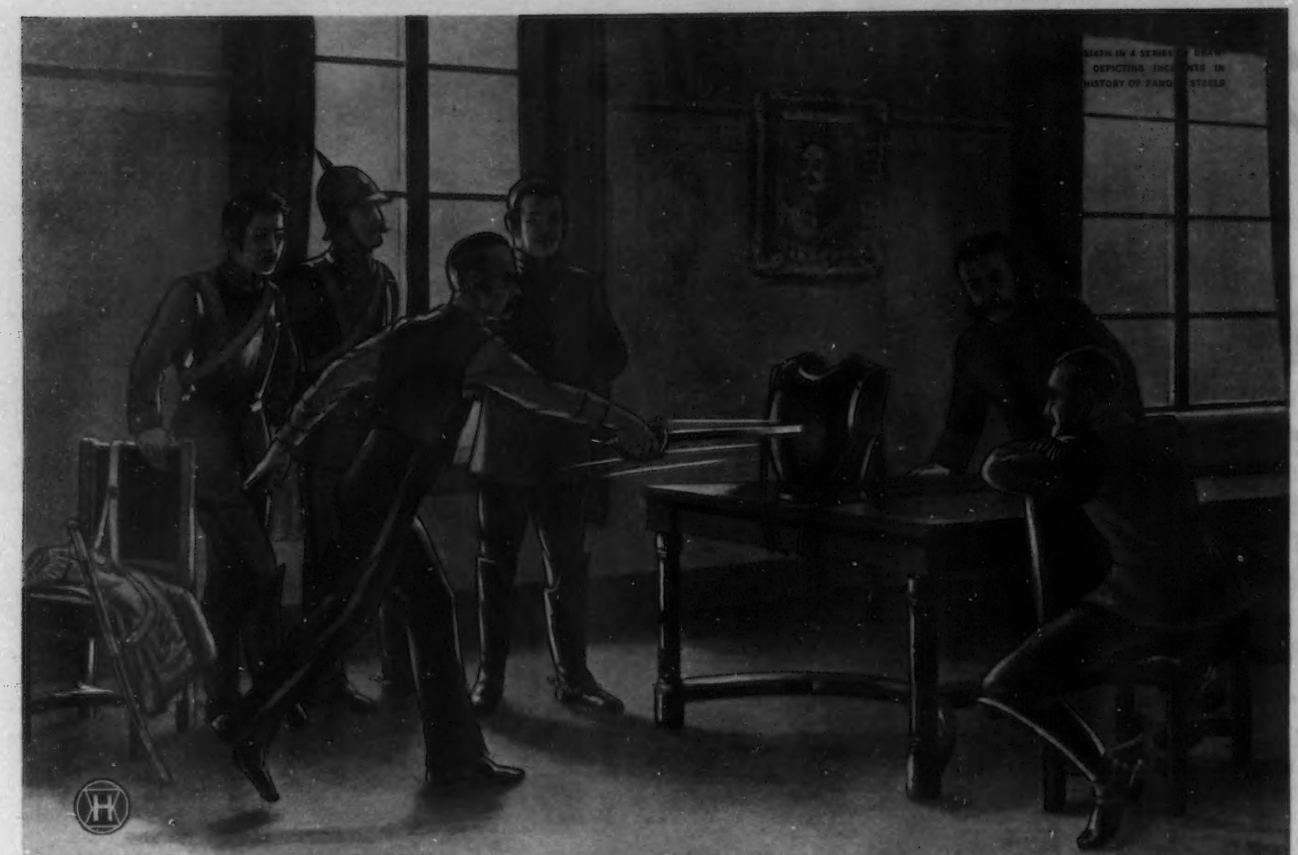

ZLATOUST and HARRISBURG—
Steels that Carved Higher Standards

With Europe waddling in the long depression that followed the Napoleonic Wars, the bear of Russia grew to be lord of the continent. It was to arm the conquering Cossacks of Nicholas I that General Anossoff developed at Zlatoust, deep in the Ural Mountains, amazing blades so keen and hard they would cleave nails without causing a gap. Above, one is shown piercing a cuirass. General Anossoff died and took his secret with him. . . . At Harrisburg, amid the Blue Ridge Mountains, steels are being produced today that are also setting new standards of service. Indeed here at "Harrisburg" the development of steels that will carefully fill the metal requirements of specific products is a tradition. . . . The accumulated experience of generations of "Harrisburg" experts in meeting metal specifications and obtaining desired physicals—small fifty-ton furnaces where relatively tailor-made heats are run—close collaboration between metallurgists and mechanical engineers—these are decisive factors that establish the superiority of the metal and the engineering of Harrisburg Steel Corporation products.

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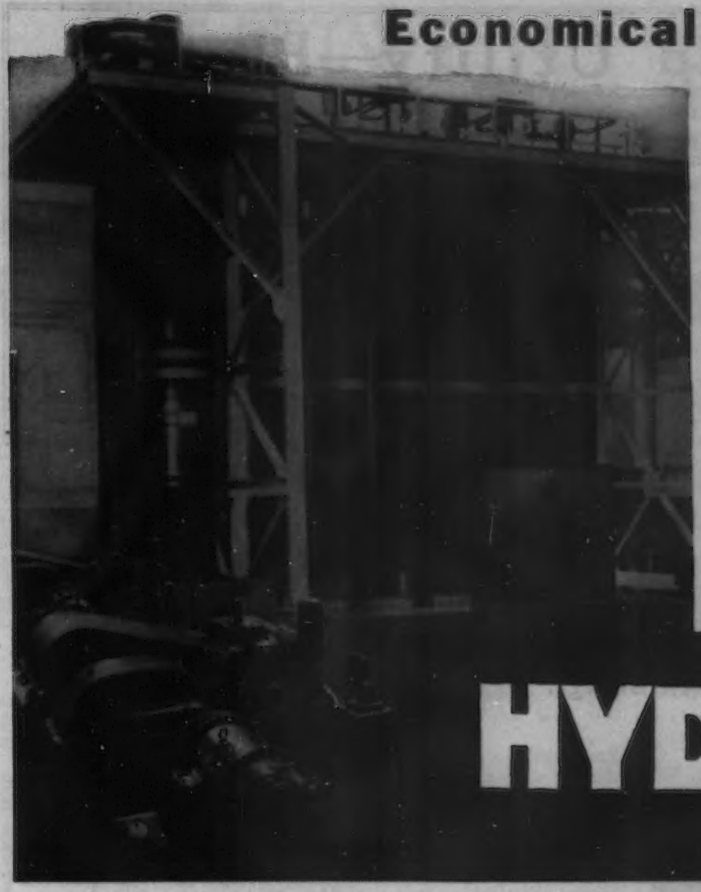

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Fig. 1334
Pat. Applied For

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Fig. 705

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Fig. 732
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Fig. 981 Pat. Pending

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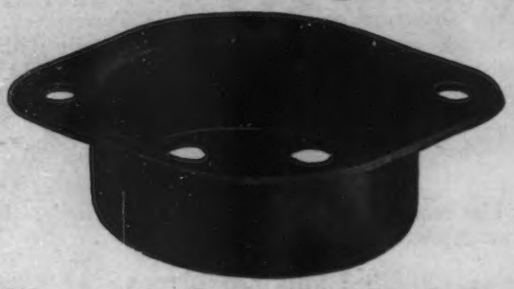

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New Industrial Literature!

This is the title of a page in this issue reviewing new catalogs, bulletins, etc. See index for page number.

JUST BETWE N US TWOE

Unmelancholy Dane Drops In

AMONG those who stopped in at our booth at the Steel Show was K. K. Madsen of the Elsinore Shipbuilding & Engineering Co., Elsinore, Denmark. That, as you know, was the home of the prince whose father's ghost could a tale unfold whose lightest word would harrow up thy soul, freeze thy young blood; make thy two eyes, like stars, start from their spheres.

We were going to ask Mr. Madsen if the shade still walks the ramparts of the castle, which is still standing, but thought we had better not. Some people are sensitive about such things.

Knocks Out Cupid in First Round

WE feel that it is but our simple duty to the eighteen loyal readers of this column to keep them informed of the virtues of their favorite journal. But it is tiresome to us to keep continually harping on the fact that no other trade paper in the industry is so widely read as this, no other has so much advertising, and no other of large circulation has such an Everestean subscription renewal percentage.

> There must be a more tuneful way of singing our praises. We could, for example, tell about the manufacturer who is so much attached to The Iron Age that he took a copy along on his honeymoon to Niagara Falls.

He not only took it along but read it en route, saw an ad concerning some material offered by a firm in Buffalo, stopped off and bought the material, rejoined his bride who was also making the trip, and proceeded to the Falls.

True, it is a score for us, but we are almost sorry it happened, for the fact that a trade paper should be permitted to intrude at such a sacred moment seems to us to mark a decline in the race, and the thought of it saddens us somehow.

Note to Westinghouse Treasurer

THE man who coined the name "Millite" for Westinghouse's new heavy-duty lighting unit should get a raise. It's easy on the tongue and ear—hard to mispronounce—exactly descriptive—a natural.

Unsigned Check Seeks Home

IF the subscriber who sent us check No. 661 for $6, drawn on The Provident Savings Bank & Trust Co., Liberty & Freeman Branch, Cincinnati, will send us his name we will send the check back to him for autographing.

Misses One Note on "E" String

IT was years before we could be certain, without looking it up, whether the "Carbide" or the "Carbon" came first in Union Carbide & Carbon. We finally fixed the proper order in our mind by observing that the sequence was alphabetical.

But with Brown & Sharpe it is harder. We are never sure whether Mr. Brown or Mr. Sharpe gets the "e," and we see that E. B. Edgerton, who wrote that article, "A New Gage System," in the Oct. 14 issue, has the same trouble. Most of the time he has it right, but in one case he has it "Brown & Sharp." We read the article all the way through to see if he balanced the shortage by making it "Browne & Sharp" another time, but he didn't.

Stopper

WIDOWED by Waste—*The Yale & Towne Mfg. Co.*

Correction

HIT between our close-set eyes by the novel word "backwardation," we dived into the dictionary a while ago and emerged triumphantly with this definition between our teeth—"an agreement between buyer and seller for future delivery."

A tin broker informs us that although that may be the dictionary definition it isn't the trade meaning. "Backwardation" signifies the unusual market condition when spot tin is selling lower than futures, and is usually expressed as a difference in price—a backwardation of five shillings tuppence, etc.

"Contango" is the exotic term that expresses the commoner market condition, when tin for future delivery in selling at a lower price than spot tin.

Sorry.

Times Pulls Boner

> THEY found that as little as .$5 to .17 per cent of chromium when added was enough to cause the brass grains to shrink up.—*New York Times*

And who wouldn't, with all that confusion?

—A.H.D.

5 "Don'ts" for Busy Men

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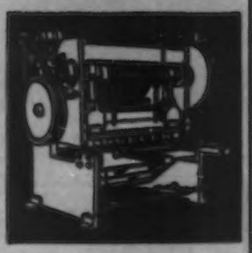

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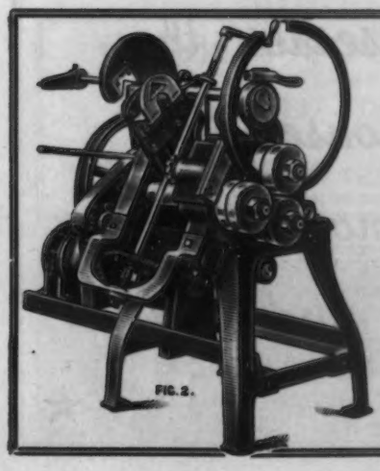

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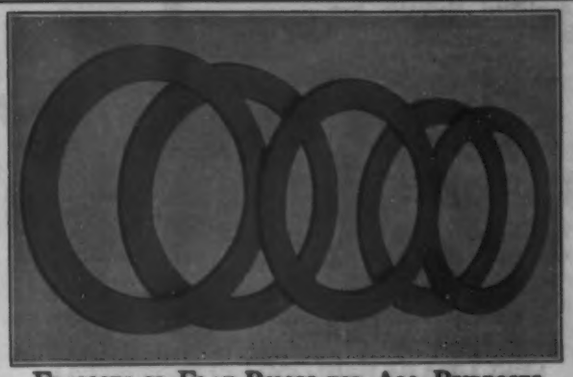

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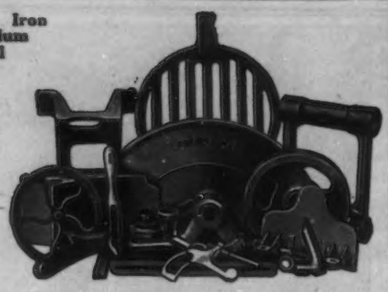

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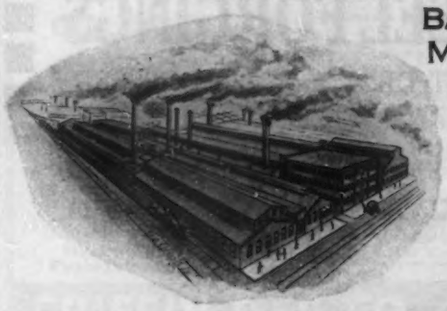

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Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Acme Steel Co., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Ransohoff, N., Inc., Cincinnati.

BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Ransohoff, N., Inc., Cincinnati.
Whiting Corp., Harvey, Ill.

BARS—Alloy
Republic Steel Corp., Cleveland, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BARS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

BARS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
USL Battery Corp., Niagara Falls, N. Y.

BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.

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BEARINGS—Babbitt
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.

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Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.

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Schatz Mfg. Co., Poughkeepsie, N. Y.

BEARINGS, Brass and Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Lawrenceville Bronze Co., Pittsburgh.
National Bearing Metals Corp., Pittsburgh.

BEARINGS—Oilless
Bunting Brass & Bronze Co., Toledo, O.
Rhoades, B. W., Metaline Co., Inc., Long Island City, N. Y.
Richardson Co., The, Melrose Park, Ill.

BEARINGS—Quill
Bantam Bearings Corp., The, South Bend, Indiana.

BEARINGS—Radial
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Roll Neck
Bantam Bearings Corp., The, South Bend, Indiana.
Morgan Construction Co., Worcester, Mass.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller
Bantam Bearings Corp., The, South Bend, Indiana.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.
Standard Machinery Co., Providence, R. I.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Roller Tapered
Bantam Bearings Corp., The, South Bend, Indiana.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Rolling Mill Equipment
Bantam Bearings Corp., The, South Bend, Indiana.
Richardson Co., The, Melrose Park, Ill.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Timken Roller Bearing Co., The, Canton, O.

BEARINGS—Self-aligning Roller
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

BEARINGS—Shaft Hanger
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Shafer Bearing Corp., 35 East Wacker Drive, Chicago.

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Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Hyatt Bearings Div., General Motors Corp., Newark, N. J.
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BELT DRESSING
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BELT LACING
Rhoads, J. E., & Sons, Philadelphia.

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Goodyear Tire & Rubber Co., Akron, Ohio.
Goodrich, B. F., Co., The, Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

BELTING CEMENT
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia.

BELTING—Metal, Conveyor, High and Low Temperature
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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

BELTING—Rubber
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Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.

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Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

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Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Kane & Roach, Inc., Syracuse, New York.
Niagara Machine & Tool Works, Buffalo, N. Y.

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American Brass Co., The, Waterbury, Conn.

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Rustless Iron & Steel Corp., Baltimore, Md.

BILLETS—Chrome Steel
Rustless Iron & Steel Corp., Baltimore, Md.

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Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.

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Alan Wood Steel Co., Conshohocken, Pa.

BILLETS—Steel
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Continental Steel Corp., Kokomo, Ind.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

BIMETAL—Thermostatic
Chace, W. M., Co., 1605 Beard Ave., Detroit.

BINS—Rotating
Frick-Gallagher Mfg. Co., The, Wellston, Ohio.

BLANKS—Chisel
Cleveland Steel Tool Co., The, 660 E. 32nd St., Cleveland, Ohio.

BLANKS—Gear and Pinion
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Richardson Co., The, Melrose Park, Ill.

BLANKS—Gear, Silent Steel
Waldron, John, Corp., New Brunswick, N. J.

BLAST CLEANING EQUIPMENT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

BLAST FURNACES
Brassert, H. A., & Co., Chicago, Ill.

BLAST GATES
Rockwell, W. S., Co., 50 Church St., N. Y. C.

BLOCKS—Chain
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

BLOWERS
American Air Filter Co., Inc., Louisville, Ky.
American Blower Corp., 6000 Russell St., Detroit.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
North American Mfg. Co., The, Cleveland
Spencer Turbine Co., Hartford, Conn.

BLOWPIPES—Oxy-Acetylene Welding & Cutting
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
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BOILERS—Water Tube
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

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Landis Mch. Co., Inc., Waynesboro, Pa.

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BOLT & RIVET CLIPPERS
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Helwig Mfg. Co., St. Paul, Minn.

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Cleveland (Ohio) Cap Screw Co., The
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Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., Pittsburgh.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
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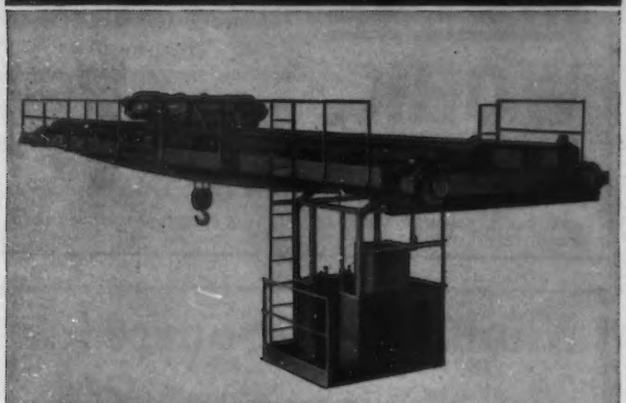

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Oliver Iron & Steel Corp., Pittsburgh.
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Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

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BORING BARS
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BRICK—Insulating
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BRUSHES—Wire
Pittsburgh Plate Glass Co., Brush Div., Baltimore, Md.

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BUCKETS—Electric Motor
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BUCKETS—Orange Peel
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Belmont Iron Works, Philadelphia.
Bethlehem (Pa.) Steel Co.
Blaw-Knox Co., Pittsburgh.
Ferguson, H. K., Co., The, Cleveland.
Iron & Steel Products, Inc., Chicago.

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Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Steelweld Machinery Co., Cleveland.

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Phosphor Bronze Smelting Co., The, Phila.

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Udylite Co., The, Detroit.

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Phosphor Bronze Smelting Co.,The, Phila.
Snyder, W. P., & Co., Pittsburgh.
Spencer's, I. S., Sons, Inc., Guilford, Ct.

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Lane Mfg. Co., Montpelier, Vt.
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Hartford (Conn.) Electric Steel Corp.
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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CEMENT—Quick Setting, Acid Proof & Insulator
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

CEMENT—Refractory
Carborundum Co., The, Perth Amboy, N. J.
Johns-Manville Corp., 22 East 40th St., New York City.
Quigley Co., Inc., 56 West 45th St., N. Y. C.

CEMENT—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.

CHAINS—Conveyor & Elevator
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Webster Mfg. Co., Chicago.

CHAINS—Portable
Barrett-Cravens Co., Chicago, Illinois

CHAINS—Power Transmission
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Boston Gear Works, Inc., North Quincy, Mass.
Diamond Chain & Mfg. Co., Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Ramsey Chain Co., Inc., Albany, N. Y.
Webster Mfg. Co., Chicago.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Roller
Baldwin-Duckworth Chain Corp., Springfield, Mass.
Bartlett, C. O.-Snow Co., The, Cleveland.
Diamond Chain & Mfg. Co. Indianapolis, Ind.
Link-Belt Co., Chicago.
Morse Chain Co., Ithaca, New York.
Whitney Chain & Mfg. Co., Hartford, Ct.

CHAINS—Silent
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Morse Chain Co., Ithaca, New York.
Ramsey Chain Co., Inc., Albany, N. Y.
Whitney Chain & Mfg. Co., Hartford, Ct.

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Cunningham, M. E., Co., Pittsburgh.
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

CHEMICALS—Rust Proofing
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

CHROMIUM METAL & ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

CHUCKING MACHINES—Multiple Spindle
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Gosa & DeLeeuw Machine Co., New Britain, Conn.
National Acme Co., The, Cleveland.

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Hannifin Mfg. Co., Chicago.

CHUCKS—Drill
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Cushman Chuck Co., Hartford, Conn.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

CHUCKS—Electric
Cushman Chuck Co., Hartford, Conn.

CHUCKS—Lathe
Cushman Chuck Co., Hartford, Conn.

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

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Detroit Rex Products Co., Detroit, Mich.
Ford, J. B., Co., The, Wyandotte, Mich.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Phila., Pa.

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Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

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Detroit Rex Products Co., Detroit, Mich.

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Safety Equipment Service Co., Cleveland.

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Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

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Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, New York.

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Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

COAL
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Hanna Furnace Corp., The, Detroit, Mich.
Koppers Coal Co., Inc., The, Pittsburgh.
Pickands Mather & Co., Cleveland.

COAL, ORE AND ASH HANDLING MACHINERY
Bartlett, C. O.-Snow Co., The, Cleveland.
Robins Conveying Belt Co., 15 Park Row, N. Y. C.
Webster Mfg. Co., Chicago.

COBALT METAL
Central Trading Corp., 511 Fifth Ave., N. Y. C.

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Harrisburg (Pa.) Steel Corp.

COKE—Metallurgical
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Pickands Mather & Co., Cleveland.

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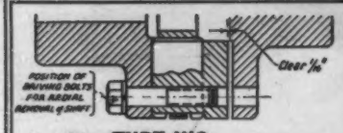

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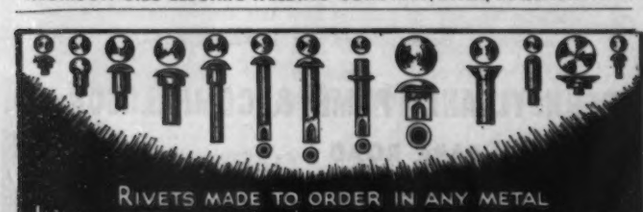

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Waterbury (Conn.) Farrel Foundry & Machine Co., The.
HEADS—Spun and Pressed
Central Iron & Steel Co., Harrisburg, Pa.
Worth Steel Co., Claymont, Del.
HEADS—Steel—Flanged & Dished
Central Iron & Steel Co., Harrisburg, Pa.
HEAT RESISTING PRODUCTS—Electric
Globar Div., The Carborundum Co., Niagara Falls, N. Y.
Holden, A. F., Co., New Haven, Conn.
HEAT TREATING
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
General Machine Wks., York, Pa.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Holden, A. F., Co., New Haven, Conn.
Parish Pressed Steel Co., Reading, Pa.
HEAT TREATING COMPOUNDS
Holden, A. F., Co., New Haven, Conn.
HEAT TREATING EQUIPMENT — Air Draw
Holden, A. F., Co., New Haven, Conn.
Maehler, Paul Co., The, Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.
HEATERS—Unit
Dravo Corp., Pittsburgh.
HEATING RESISTANCE — Non-Metallic
Globar Div., The Carborundum Co., Niagara Falls, N. Y.
Holden, A. F., Co., New Haven, Conn.
HOISTS—Air
Curtis Pneumatic Machinery Co., 1943 Kienlen Ave., St. Louis, Mo.
Detroit (Mich.) Hoist & Mach. Co.
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Ingersoll-Rand Co., 11 Broadway, N. Y. C.
Northern Engineering Works, Detroit.
Ridgway, Craig & Son Co., Coatesville, Pa.
HOISTS—Chain
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.
HOISTS—Electric
American Engineering Co., Philadelphia.
Detroit (Mich.) Hoist & Mach. Co.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Maris Brothers, Inc., Philadelphia.
Northern Engineering Works, Detroit, Mich.
Philadelphia (Pa.) Gear Works.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Wright Mfg. Div., American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.
HOISTS—Electric Traveling
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
HOISTS—Monorail
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
HOISTS—Scraper
Sullivan Machinery Co., Claremont, N. H.
HOSE—Air, Oil, Steam and Water
Pennsylvania Flexible Metallic Tubing Co., Philadelphia.
HOSE—Flexible Metallic
American Brass Co., The, Waterbury, Conn.
Pennsylvania Flexible Metallic Tubing Co., Philadelphia.
HOSE—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
HYDRANTS—Fire
Wood, R. D., & Co., Philadelphia.
HYDRAULIC MACHINERY
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Chambersburg (Pa.) Engineering Co.
Elmes, Chas. F., Engng. Wks., Chicago.
Farquhar, A. B., Co., Ltd., York, Pa.
Hydraulik Gmbh, Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sts., Buffalo, N. Y.
Morgan Engineering Co., The, Alliance, O.
Wood, R. D., & Co., Philadelphia.
INGOT MOLDS
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.
Valley Mould & Iron Corp., Hubbard, Ohio.

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INGOTS—Aluminum
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.

INGOTS—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Phila.

INHIBITORS
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc. Grasselli Chemicals Dept., Wilmington, Del.

INSTRUMENTS—Electric
Weston Electrical Instrument Corp., Newark, N. J.

INSTRUMENTS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

INSULATION
Johns-Manville Corp., 22 East 40th St., New York City.

IRON—Rustless
Ludlum Steel Co., Watervliet, N. Y.

JIGS, FIXTURES, DIES, etc. (See Dies, Jigs, Fixtures, etc.)

KEYS—Riveted
Western Wire Prods. Co., St. Louis, Mo.

KEYSEATING MACHINES
Baker Bros., Inc., Toledo, Ohio.
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

LACING—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LAGGING—Insulating
Quigley Co., Inc., 56 West 45th St., N. Y. C.

LAMPS—Filament
General Electric Co., Cleveland.

LAMPS—Mercury Vapor
General Electric Vapor Lamp Co., Hoboken, N. J.

LAPPING MACHINES
Cincinnati (Ohio) Grinders Incorporated.

LATHES—Automatic
Baird Mch. Co., The, Brideport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Goss & De Leeuw Mch. Co., New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Cincinnatti.
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.

LATHES—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.
Rivett Lathe & Grinder, Inc., Boston, Mass.

LATHES—Brass
Warner & Swasey Co., The, Cleveland.

LATHES—Chucking
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES—Contour Turning
Monarch Mch. Tool Co., The, Sidney, O.

LATHES—Crankshaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.

LATHES—Engine
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

LATHES—Roll
Lewis Foundry & Mch. Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

LATHES — Second-Hand. (See Clearing House Section)

LATHES—Toolroom
LeBlond, R. K., Machine Tool Co., Cincinnati, Ohio.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

LATHES—Turret
Acme Machine Tool Co., Cincinnati.
Bardons & Oliver, Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mch. Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

LATHES, Turret, Vertical
Bullard Co., The, Bridgeport, Conn.
Rogers Machine Wks., Alfred, New York.

LAYOUT FLUID
Dayton Rogers Mfg. Co., Minneapolis, Minn.

LEAD LININGS
Dietzel Lead Burning Co., Pittsburgh.

LEATHER—Cup
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

LEGGINS—Safety
Safety Equipment Service Co., Cleveland.

LEVELING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Wean Engineering Co., Inc., The, Warren, O.

LINING—Converter
Edge Hill Silica Rock Co., New Brunswick, New Jersey.

LOCK WASHER MACHINERY
Sleeper & Hartley, Inc., Worcester, Mass.

LOCOMOTIVES—Electric
Atlas Car & Mfg. Co., The, Cleveland.
Davenport (Iowa) Locomotives Works.
General Electric Co., Schenectady, N. Y.

LOCOMOTIVES—Gasoline
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Gas-Electric
Davenport (Iowa) Locomotives Works.

LOCOMOTIVES—Industrial
Davenport (Iowa) Locomotives Works.
Plymouth (Ohio) Locomotive Works.

LOCOMOTIVES—Steam
Iron & Steel Products, Inc., Chicago.

LOCOMOTIVES—Storage Battery
Atlas Car & Mfg. Co., The, Cleveland.

LUBRICANTS—Crusher & Grinding
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Gear
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—High Pressure & Temperature
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mine Cars
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Mining Machines
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Railroad
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Roll Neck—Anti-Friction & Plain
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

LUBRICANTS—Tipple & Cleaning
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco; Shell Bldg., St. Louis, and 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Sales Offices in Principal Cities
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Erdle Perforating Co., Rochester, N. Y.

MACHINE WORK
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General Machine Works, York, Pa.
Gifford-Wood Co., Hudson, N. Y.
Houde Engineering Corp., Buffalo, N. Y.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

MACHINERY DEALERS — Second-Hand, (See Clearing House Section)

MACHINISTS' SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Starrett, L. S., Co., Athol, Mass.

MAGNESITE—Brick or Dead Burnt
Carborundum Co., The, Perth Amboy, N. J.

MAGNESIUM
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

MAGNETS—Lifting
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleve.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

MALLETS—Rawhide
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

MANDRELS—Expanding
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

MANHOLE FITTINGS AND SADDLES
Worth Steel Co., Claymont, Del.

MANIFOLDS—Oxygen & Acetylene
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

MARKING MACHINES
Noble & Westbrook Mfg. Co., The, East Hartford, Conn.

METAL SPECIALTIES
Crosby Co., The, Buffalo, N. Y.
Grammes, L. F., & Sons, Inc., Allentown, Pa.
Toledo (Ohio) Stamping & Mfg. Co.
Torrington (Conn.) Company.
Truscon Steel Co., Pressed Steel Div., Cleveland.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Stamped Metal Co.

METAL—Thermostatic Bimetal
Chace, W. M., Co., 1605 Beard Ave., Detroit.

METALS—Coating
Metals Coating Co. of America, Phila., Pa.

METERS—Electric Welding
Lincoln Electric Co., The, Cleveland.

METERS—Flow
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

METERS—Water & Oil
Worthington Pump & Machinery Corp., Harrison, N. J.

MICA SCHIST
Edge Hill Silica Rock Co., New Brunswick, New Jersey.

MICROMETERS
Starrett, L. S., Co., Athol, Mass.

MICROMETERS—Automatic, for Rolling Mills
Haines Gauge Co., The, Phila., Pa.

MILLING MACHINES—Automatic
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Horizontal
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MILLING MACHINES—Planer Type
Cincinnati (Ohio) Planer Co.

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MILLING MACHINES—Vertical
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.

MOLDING MACHINES
Tabor Mfg. Co., Phila., Pa.

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.

MONEL METAL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

MONORAIL SYSTEMS—Hand & Electric
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.

MOTORS—Electric
Allis-Chalmers Mfg. Co., Milwaukee.
Century Electric Co., St. Louis, Mo.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., Cleveland.
Reliance Electric & Engineering Co., Cleveland.
Westinghouse Elec. & Mfg. Co., E. Ptgh.

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MUFFLES—Alloy
Electro Alloys Co., Elyria, Ohio.

NAILS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Youngstown (Ohio) Sheet & Tube Co., The.

NIBBLING MACHINES
Gray Machine Co., Philadelphia.

NICKEL
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

NICKEL ANODES—Rolled or Cast
Seymour (Conn.) Mfg. Co.

NICKEL SILVER
Seymour (Conn.) Mfg. Co.

NITROGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.

NOZZLES—Sand Blasting
Norton Co., Worcester, Mass.

NUMBERING MACHINES—For Metal
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

NUT MACHINERY — Automatic Cold Pressed
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

NUTS—Acorn
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Castellated
National Acme Co., The, Cleveland.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Cold Punched
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Hot Pressed
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Lock
Standard Pressed Steel Co., Jenkintown, Pa.

NUTS—Machine Screw
Blake & Johnson Co., The, Waterville, Ct.

NUTS—Semi-Finished
Cleveland (Ohio) Cap Screw Co., The.
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Thumb Malleable
Republic Steel Corp., Upson Nut Div., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS—Wing
Parker-Kalon Corp., 196 Varick St., N. Y. C.

OIL & GREASE SEALS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL RETAINERS
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

OIL STONES
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

OILS—Cutting
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Socony-Vacuum Oil Co., Inc., 26 Broadway, N. Y. C.
Standard Oil Co. (Indiana), Chicago, Ill.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

OILS—Fuel
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
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Sun Oil Co., Philadelphia.
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OILS—Lubricating
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Standard Oil Co. (Indiana), Chicago.
Texas Company, The, 135 East 42nd St. N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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ORES—Iron
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands Mather & Co., Cleveland.
Shenango Furnace Co., Pittsburgh.
Snyder, W. P., & Co., Pittsburgh.

OVENS—Coke and By-Product Recovery
Koppers Co., Pittsburgh.

OVENS—Core and Mold
Herrington & Randall, Inc., Detroit.
Holcroft & Co., Detroit.
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OVENS—Cross Regenerative
Koppers Co., Pittsburgh.

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OVENS—Enameling and Japanning
Carborundum Co., The, Perth Amboy, N. J.
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Maehler, Paul Co., The, Chicago.
Surface Combustion Corp., 2375 Dorr St., Toledo.

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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

OXYGEN
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

PACKING—Felt
American Felt Co., 315 Fourth Ave., N. Y. C.

PACKING—Hydraulic
Rhoads, J. E. & Sons, Philadelphia.

PACKING—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia.

PACKING—Metallic
Garlock Packing Co., The, Palmyra, N. Y.

PACKING—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

PACKING—Sheet, Asbestos or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.

PAINT
Midland Paint & Varnish Co., The, Cleveland.

PAINT STICKS
Helmer & Staley, Inc., Chicago, Ill.

PERFORATED METAL
Chicago Perforating Co., 2440 W 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

PHOSPHOR—Copper
Phosphor Bronze Smelting Co., The, Phila.

PICKLING COMPOUNDS
American Chemical Paint Co., Ambler, Pa.

PICKLING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Mesta Mch. Co., Pittsburgh.

PICKLING TANK LININGS
Cellcote Co., The, Cleveland.
Keagler Brick Co., Steubenville, Ohio.

PICKLING TANK STEAM JETS
Dietzel Lead Burning Co., Pittsburgh.
Durion Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

PIG IRON
Bethlehem (Pa.) Steel Co.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Hanna Furnace Corp., The, Detroit, Mich.
Pickands Mather & Co., Cleveland.
Republic Steel Corp., Cleveland, Ohio.
Shenango Furnace Co., Pittsburgh.
Shenango-Penn Mold Co., Pittsburgh.
Superior Charcoal Iron Co., Grand Rapids, Mich.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

PIG IRON—Charcoal
Superior Charcoal Iron Co., Grand Rapids, Mich.

PILING—Steel Pipe
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PILING—Steel Sheet
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

PINIONS—Rolling Mill
Mesta Mch. Co., Pittsburgh.

PINIONS—Wire and Rod
Rathbone, A. R. & J., Palmer, Mass.

PINS—Cotter
Lamson & Sessions Co., The, Cleveland.

PIPE—Cast Iron, B. & S. and Flanged
Wood, R. D., & Co., Philadelphia.

PIPE—Hammer Welded
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

PIPE—New and Second-Hand
Albert & Davidson Pipe Corp., 2nd Ave., 50-51st St., Bklyn., N. Y.
Albert Pipe Supply Co., Inc., Berry and N. 13th St., Bklyn., N. Y.
Greenpoint Iron & Pipe Co., Inc., Stagg & Bogart Sts., Bklyn., N. Y.

PIPE—Seamless Brass or Copper
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

PIPE—Spiral Welded
American Rolling Mill Co., Middletown, O.
Crane Co., Chicago.

PIPE—Standard, Black and Galvanized
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Youngstown (Ohio) Sheet & Tube Co., The.

PIPE—Welded, Electric
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.

PIPE COVERING—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

PIPE FITTINGS
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.

PIPE THREADING & CUTTING MACHINES
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Jarecki Mfg. Co., Erie, Pa.
Landis, Mach. Co., Inc., Waynesboro, Pa.
Merrell Mfg. Co., Toledo.
Murchey Machine & Tool Co., Detroit.
Taylor-Wilson Mfg. Co., McKees Rocks, Pa.

PLANERS
Cincinnati (Ohio) Planer Co.

PLANING MACHINES — Second Hand. (See Clearing House Section)

PLASTICS—Laminated
Bakelite Corp., 247 Park Ave., N. Y. C.

PLASTICS — Laminated or Molded Phenolic
Richardson Co., The, Melrose Park, Ill.

PLASTICS—Molded
Bakelite Corp., 247 Park Ave., N. Y. C.
Haveg Corporation, Newark, Delaware.

PLASTICS—Synthetic
Bakelite Corp., 247 Park Ave., N. Y. C.

PLATER'S CLEANING COMPOUND
American Chemical Paint Co., Ambler, Pa.

PLATES—Floor or Cellar Door
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila., Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Central Iron & Steel Co., Harrisburg, Pa.
Inland Steel Co., Chicago.

PLATES—Iron or Steel
Alan Wood Steel Co., Conshohocken, Pa.
American Pressed Steel Co., Phila., Pa.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Central Iron & Steel Co., Harrisburg, Pa.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Joseph T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Worth Steel Co., Claymont, Del.
Youngstown (Ohio) Sheet & Tube Co., The.

PLATFORMS—Skid
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

PLUGS—Core Hole
Hubbard, M. D., Spring Co., 750 Central Ave., Pontiac, Mich.

POLISHING & BUFFING MACHINES—Automatic
Packer Machine Co., The, Meriden, Conn.

POLISHING MACHINES
Continental Machine Specialties, Inc., Minneapolis, Minn.
Packer Machine Co., The, Meriden, Conn.

POLISHING MACHINES—Bar
Medart Co., The, St. Louis, Mo.

POLISHING MACHINES—Belt
Production Machine Co., Greenfield, Mass.

POTS—Lead, Cyanide or Carbon
Electro Alloys Co., Elyria, Ohio.

POWER UNITS—Rotary
Cushman Chuck Co., Hartford, Conn.
New Departure Div., General Motors Corp., Bristol, Conn.

POWER UNITS—Straight Line
Cushman Chuck Co., Hartford, Conn.

PRECIPITATORS—Electrostatic Dust
Pangborn Corporation, Hagerstown, Md.

PRESS FEEDS—Automatic
Littell, F. J., Mch. Co., Chicago.

PRESSED METAL PARTS
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Crosby Co., The, Buffalo, N. Y.
Stanley Works, The, New Britain, Conn.; Bridgeport, Conn.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.

PRESSED STEEL PARTS
Crosby Co., The, Buffalo, N. Y.
Lansing (Mich.) Stamping Co., So. Penn Ave.
Parish Pressed Steel Co., Reading, Pa.
Toledo (Ohio) Stamping & Mfg. Co.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Truscon Steel Co., Pressed Steel Div., Cleveland.

PRESSES—Automatic
Henry & Wright Mfg. Co., The, Hartford, Conn.
Niagara Mch. & Tool Wks., Buffalo, N. Y.
V & O Press Co., Hudson, N. Y.

PRESSES—Baling
Galland-Henning Mfg. Co., Milwaukee.

PRESSES—Baling, Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Galland-Henning Mfg. Co., Milwaukee.

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PRESSES—Coining
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Drop—See Hammers—Drop

PRESSES—Foot
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Niagara Machine & Tool Works, Buffalo, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

PRESSES—Forging
Ajax Mfg. Co., The, Euclid, Ohio.
Hydraulik Gmbh. Duisburg, Germany.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.

PRESSES—Forming and Bending
Cincinnati (Ohio) Shaper Co., The.
Dreis & Krump Mfg. Co., Chicago.
Niagara Mch. & Tool Wks., Buffalo, N. Y.
U. S. Tool Co., Inc., Ampere, N. J.

PRESSES—Friction Screw
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Zeh & Hahnemann Co., Newark, N. J.

PRESSES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Chambersburg (Pa.) Engineering Co.
Elmes, Chas. F., Engng. Wks., Chicago.
Farquhar, A. B., Co., Ltd., York, Pa.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Hannifin Mfg. Co., Chicago.
Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Mesta Mch. Co., Pittsburgh.
Morgan Engineering Co., The, Alliance, O.
Oilgear Co., The, 1311 W. Bruce, Milwaukee.
Wood, R. D., & Co., Philadelphia.

PRESSES—Power
Baird Mch. Co., The, Bridgeport, Conn.
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Farrel-Birmingham Co., Inc., Ansonia, Conn.
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Manville, E. J., Mch. Co., Waterbury, Ct.
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V & O Press Co., Hudson, N. Y.
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PRESSES—Trimming
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Niagara Mch. & Tool Wks., Buffalo, N. Y.

PULLEYS—Iron, Solid & Split
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd., Chicago.

PULLEYS—Magnetic
Cutler-Hammer, Inc., Milwaukee.

PULLEYS—Vacuum Cup
Vacuum Cup Metal Pulley Co., Inc., Detroit, Mich.

PULVERIZERS
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.
Whiting Corp., Harvey, Ill.

PUMPS—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.
Haveg Corporation, Newark, Delaware.

PUMPS—Boiler Feed
Aldrich Pump Co., The, Allentown, Pa.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.

PUMPS—Centrifugal
Aldrich Pump Co., The, Allentown, Pa.
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Pennsylvania Pump & Compressor Co., Easton, Pa.
Ruthman Machinery Co., Cincinnati.
Tomkins-Johnson Co., The, Jackson, Mich.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Coolant
Ruthman Machinery Co., Cincinnati.

PUMPS—Electric
Fairbanks, Morse & Co., Chicago.

PUMPS—Hydraulic
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American Engineering Co., Philadelphia.
Elmes, Chas. F., Engng. Wks., Chicago.
Fairbanks, Morse & Co., Chicago.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Power
Fairbanks, Morse & Co., Chicago.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Rotary Positive, Centrifugal & Turbine
Crane Co., Chicago.

PUMPS—Steam
Fairbanks, Morse & Co., Chicago.
Ingersoll-Rand Co. (Cameron), 11 Broadway, N. Y. C.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS—Vacuum
Pennsylvania Pump & Compressor Co., Easton, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUNCHES & DIES
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

PUNCHING AND SHEARING MACHINES
Beatty Mch. & Mfg. Co., 936—150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Cincinnati (Ohio) Shaper Co., The.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
G. D. S. Shearing & Punching Machine Co., 101 Walker St., N. Y. C.
Niagara Machine & Tools Works, Buffalo, N. Y.
Pels, Henry, & Co., Inc., 90 West St., N. Y. C.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Mach. Mfg. Co., Pittsburgh.

PYROMETERS—Indicating
Brown Instrument Co., The, Philadelphia, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., Philadelphia.

RAIL SPLICE BARS
Ames, W., & Co., Jersey City, N. J.

RAILS
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Foster, L. B., Co., Inc., Pittsburgh.
Frank, M. K., 480 Lexington Ave., N. Y. C.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

RAILS—Relaying
Hyman-Michaels Co., Chicago.
Iron & Steel Products, Inc., Chicago.
Sherwood, E. C., 50 Church St., N. Y. C.

RAILWAY EQUIPMENT & SUPPLIES
Fairbanks, Morse & Co., Chicago.
Iron & Steel Products, Inc., Chicago.

REAMERS
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

REAMING MACHINES
Blanchard Machine Co., The, Cambridge, Mass.

RECORDERS—Furnace Atmosphere
Brown Instrument Co., The, Philadelphia, Pa.

REELS—For Coil Stock
Littell, F. J., Mch. Co., Chicago.

REFRACTORIES
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Cleveland (Ohio) Quarries Co., The.
Illinois Clay Products Co., Joliet, Ill.
West Virginia Fire Clay Mfg. Co., Pittsburgh.

REGULATORS—Compressed Gas
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

REINFORCEMENT FABRIC—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

RETORTS—Alloy
Electro Alloys Co., Elyria, Ohio.

RIDDLES—Foundry
Ludlow-Saylor Wire Co., St. Louis, Mo.

RINGS—Iron or Steel
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Co., Burnham, Pa.

RINGS—Welded
American Welding & Mfg. Co., Warren, O.

RIVET MAKING MACHINERY
Acme Machinery Co., Cleveland.
Manville, E. J., Mch. Co., Waterbury, Ct.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

RIVET SETS
Cleveland Steel Tool Co., The, 660 E. 82d St., Cleveland, Ohio.

RIVETING MACHINES
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Hannifin Mfg. Co., Chicago.
Shuster, F. B., Co., The, New Haven, Ct.

RIVETS
Blake & Johnson Co., The, Waterville, Ct.
Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Progressive Mfg. Co., Torrington, Conn.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

RODS—Aluminum
Aluminum Co. of America, Pittsburgh.

RODS—Brass
American Brass Co., The, Waterbury, Conn.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

RODS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave. Midland, Mich.

RODS—Nickel Silver
American Brass Co., The, Waterbury, Conn.
Seymour (Conn.) Mfg. Co.

RODS—Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

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RODS—Rustless
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RODS—Welding
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American Brass Co., The, Waterbury, Conn.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Electric Arc Cutting & Welding Co., The, Newark, N. J.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Una Welding, Inc., Cleveland, Ohio.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

RODS—Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bethlehem (Pa.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
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ROLLING MACHINERY—Cold Rolling
Cold Metal Process Co., The, Youngstown, Ohio.
Lewis Foundry & Mch. Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

ROLLING MACHINERY—Sheet Metal
Lewis Foundry & Mch. Co., Pittsburgh.

ROLLING MILL MACHINERY
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Birdsboro (Pa.) Steel Foundry & Machine Co.
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Farrel-Birmingham Co., Inc., Ansonia, Ct.
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Mesta Mch. Co., Pittsburgh.
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Waterbury (Ct.) Farrel Fdry. & Mch. Co. The.

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Torrington (Conn.) Mfg. Co., The.

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Bertsch & Co., Cambridge City, Ind.
Kane & Roach, Inc., Syracuse, New York.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

ROLLS—Rubber Covered
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

ROLLS—Sand Chilled Iron and Steel
Aetna-Standard Engineering Co., The Youngstown, Ohio.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Hyde Park (Pa.) Fdry. & Mch. Co.
Lewis Foundry & Mch. Co., Pittsburgh.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
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ROLLS—Special Hardened
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Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Johns-Manville Corp., 22 East 40th St., New York City.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

ROOFING AND SIDING—Iron and Steel
Inland Steel Co., Chicago.

ROOFING & SIDING—(Zinc)—Corrugated & Plain
New Jersey Zinc Co., The, 160 Front St., N. Y. C.

ROOFING MATERIALS
Carey, Philip, Co., The, Cincinnati.

RUBBER LININGS
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.

RUBBER MOLDED PARTS
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Richardson Co., The, Melrose Park, Ill.

RUST PREVENTIVES
American Chemical Paint Co., Ambler, Pa.
American Lanolin Corp., Lawrence, Mass.
Midland Paint & Varnish Co., The, Cleveland.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING COMPOUNDS
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.

RUST PROOFING PROCESS
American Chemical Paint Co., Ambler, Pa.
Parker Rust-Proof Co., 2186 Milwaukee Ave., Detroit.
Udylite Co., The, Detroit.

RUST REMOVING
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

SAND BLAST EQUIPMENT AND MACHINES
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pangborn Corporation, Hagerstown, Md.

SAND BLAST STEEL SHOT
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.
Pittsburgh (Pa.) Crushed Steel Co.

SAND HANDLING EQUIPMENT
Bartlett, C. O.-Snow Co., The, Cleveland.

SAWING MACHINES—Metal
Espen-Lucas Mch. Works, Phila.
Peerless Mch. Co., Racine, Wis.

SAWING MACHINES—Metal-Band
Continental Machine Specialties, Inc., Minneapolis, Minn.

SAWS—Band and Hack for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.
Wells Mfg. Corp., Three Rivers, Mich.

SAWS—Circular, Rip & Cutoff
Atkins, E. C., & Co., Indianapolis.

SAWS—Friction
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

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Atkins, E. C., & Co., Indianapolis.
Peerless Mch. Co., Racine, Wis.
Starrett, L. S., Co., Athol, Mass.

SAWS—Hot Metal
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Inserted Tooth, Cold
Disston, Henry, & Sons, Inc., Philadelphia.
Tabor Mfg. Co., Philadelphia.

SAWS—Milling
Atkins, E. C., & Co., Indianapolis.
Disston, Henry, & Sons, Inc., Philadelphia.

SAWS—Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.

SCALES
Exact Weight Scale Co., Columbus, Ohio.
Fairbanks, Morse & Co., Chicago.
Streeter-Amet Co., Chicago.

SCREENS—Perforated Metal
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

SCREENS—Woven Wire
Ludlow-Saylor Wire Co., St. Louis, Mo.
Wickwire Brothers, Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

SCREW MACHINE PRODUCTS
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Blake & Johnson Co., The, Waterville, Ct.
Commonwealth Brass Corp., Detroit.
Eastern Mch. Screw Corp., New Haven.
Houde Engineering Corp., Buffalo, N. Y.
Metal Electric Processing Co., The, Toledo, Ohio.
National Acme Co., The, Cleveland.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
Progressive Mfg. Co., Torrington, Conn.
Screw Mch. Products Corp., Prov., R. I.

SCREW MACHINERY—Automatic
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

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SCREW MACHINERY—Multiple Spindle
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Cone Automatic Mach. Co., Inc., Windsor, Vt.
National Acme Co., The, Cleveland.

SCREW PLATES
Greenfield (Mass.) Tap & Die Corp.

SCREW STOCK
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.

SCREWS—Cap
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
National Acme Co., The, Cleveland
Ottemiller, Wm. H., Co., Inc., York, Pa.

SCREWS—Coach or Lag
Lamson & Sessions Co., The, Cleveland.

SCREWS—Machine
Blake & Johnson Co., The, Waterville, Ct.
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., The, Torrington, Ct.

SCREWS—Safety Set
Progressive Mfg. Co., The, Torrington, Ct.
Standard Pressed Steel Co., Jenkintown, Pa.

SCREWS—Set
Cleveland (Ohio) Cap Screw Co., The.
National Acme Co., The, Cleveland.
Ottemiller, Wm. H., Co., Inc., York, Pa.

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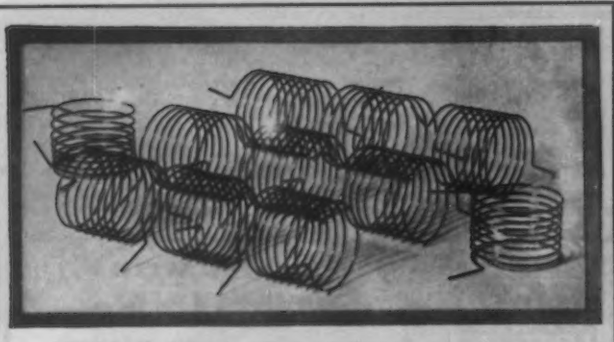

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
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Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

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Horsburgh & Scott Co., 5112 Hamilton Ave., Cleveland.
James, D. O., Mfg. Co., Chicago.
Jones, W. A., Fdry. & Mch. Co., 4401 Roosevelt Rd, Chicago.
Link-Belt Co., Chicago.
Philadelphia (Pa.) Gear Works.
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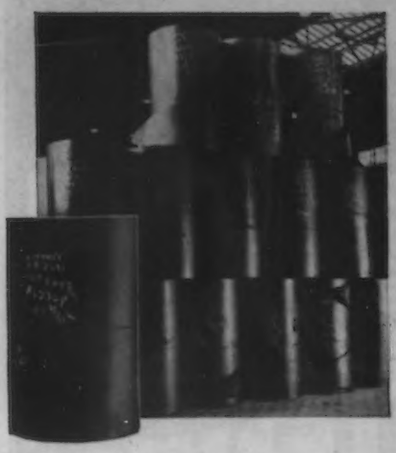

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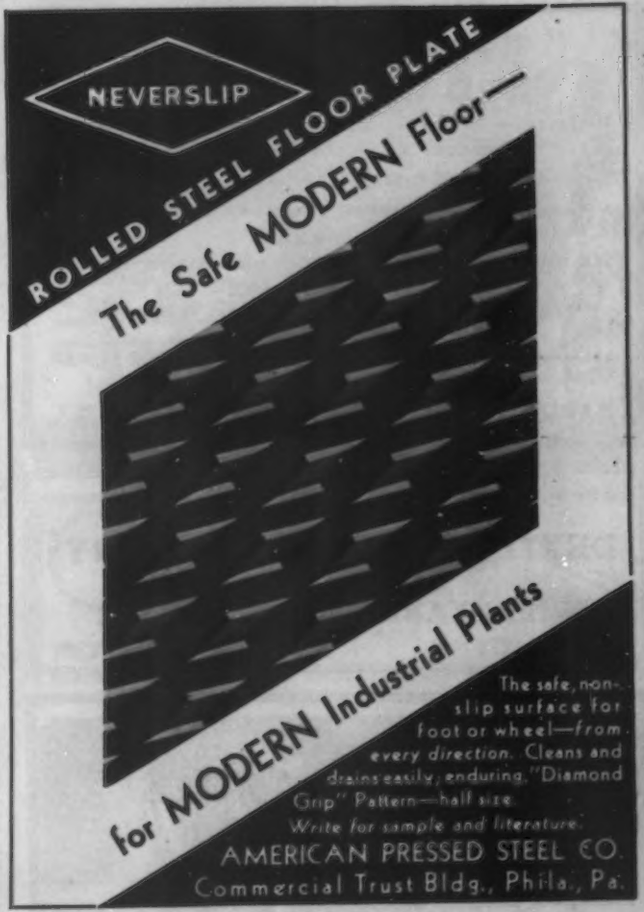
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Cleveland (Ohio) Twist Drill Co., The.
Ingersoll Steel & Disc Co., Chicago.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Milne, A., & Co., 745 Washington St., N. Y. C.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Acme Steel Co., Chicago.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Pgh.
Weirton (W. Va.) Steel Co.

STEEL—Hot Rolled Strips, Electro Zinc Coated
Thomas Steel Co., The, Warren, Ohio.

STEEL—Hot Rolled Strips, Galvanized
Acme Steel Co., Chicago.

STEEL—Magnet
Latrobe (Pa.) Electric Steel Co.

STEEL—Open Hearth
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Rustless
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Rustless Iron & Steel Corp., Baltimore, Md.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh, Pa.

STEEL—Special Analysis
Harrisburg (Pa.) Steel Corp.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Spring
Athenia Steel Co., Clifton, N. J.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace, Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Gibson, Wm. D., Co., Div. of Associated Spring Corp., Chicago.
Great Lakes Steel Corp., Detroit.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

STEEL—Stainless
Acme Steel Co., Chicago.
American Rolling Mill Co., Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Cleveland, Ohio.
Rustless Iron & Steel Corp., Baltimore, Md.
Ryerson, Jos. T., & Sons, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Superior Steel Corp., Grant Bldg., Pittsburgh.
Union Drawn Steel Co., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Co., Chicago.

STEEL—Tool
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Inc., Philadelphia.
Ingersoll Steel & Disc Co., Chicago.
Jessop Steel Co., Washington, Pa.
Jessop, Wm., & Sons, Inc., 121 Varick St., N. Y. C.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Milne, A., & Co., 745 Washington St., N. Y. C.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Windau Steel Co., Cleveland.

STEEL—Tool, Special Shapes
Forging & Casting Corp., The, Ferndale, Mich.
Latrobe (Pa.) Electric Steel Co.

STEEL—Vanadium
Latrobe (Pa.) Electric Steel Co.

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STEEL PLANTS AND ROLLING MILLS
Brassert, H. A., & Co., Chicago, Ill.

STEEL ROLLS
United Engineering & Fdry. Co., Ptgh.

STOKERS
Babcock & Wilcox, The, 85 Liberty St., New York City.
Whiting Corp., Harvey, Ill.

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Electric Controller & Mfg. Co., The, Cleveland.

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Kane & Roach, Inc., Syracuse, New York.
Medart Co., The, St. Louis, Mo.

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Kane & Roach, Inc., Syracuse, New York.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Co.
Morgan Engineering Co., The, Alliance, O.

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STUDS
Erie (Pa.) Bolt & Nut Co.

SUB PRESSES
U. S. Tool Co., Inc., Ampere, N. J.

SUPERHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

SWAGING MACHINES
Standard Machinery Co., Providence, R. I.
Torrington (Conn.) Company.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Ptgh.

TANK LININGS
Cellcote Co., The Cleveland.
Nukem Prods. Corp., 68 Niagara St., Buffalo, N. Y.

TANK LININGS—Rubber
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Alkali Cleaning
Detroit Rex Products Co., Detroit, Mich.

TANKS—Compressed Air, Gas, Oil and Water
Scaife, Wm. B., & Sons Co., Ptgh.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

TANKS—Iron and Steel
Munroe R., & Sons Mfg. Corp., Pittsburgh.
Scaife, Wm. B., & Sons, Co., Ptgh.

TANKS—Lead Lined
Dietzel Lead Burning Co., Pittsburgh.

TANKS—Pickling
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.
Blaw-Knox Co., Pittsburgh.
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Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Haveg Corporation, Newark, Delaware.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

TANKS—Rubber Lined
Blaw-Knox Co., Pittsburgh.
Goodrich, B. F., Co., The, Akron, Ohio.
Goodyear Tire & Rubber Co., Akron, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

TANKS—Welded
Blaw-Knox Co., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Scaife, Wm. B., & Sons Co., Pittsburgh.

TAPPING MACHINES
Baker Bros. Inc., Toledo, Ohio.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.
National Automatic Tool Co., Richmond, Ind.

TAPS—Collapsing
Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.

TAPS AND DIES
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

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TERNE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TESTING MACHINES—Dustility
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Hardness
Olsen, Tinius Testing Machine Co., Philadelphia.
Shore Instrument & Mfg. Co., The, Jamaica, L. I., N. Y.

TESTING MACHINES—Impact
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Materials
Baldwin-Southwark Corp., Southwark Div., Phila.
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Spring
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Tensile
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Torsion
Olsen, Tinius Testing Machine Co., Philadelphia.

TESTING MACHINES—Universal
Olsen, Tinius Testing Machine Co., Philadelphia.

THERMOMETERS
Weston Electrical Instrument Corp., Newark, N. J.

THERMOMETERS—Recording
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., Philadelphia.

THERMOSTATIC—Bimetal
Chace, W. M., Co., 1605 Beard Ave., Detroit.

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THREAD ROLLING MACHINES
Manville, E. J., Mch. Co., Waterbury, Ct.
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

THREADING MACHINES
Eastern Mach. Screw Corp., New Haven, Conn.
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADING MACHINES—Bolt
Murchey Machine & Tool Co., Detroit.

TIE PLATES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Weirton (W. Va.) Steel Co.

TIES—BALE
Acme Steel Co., Chicago, Ill.

TIN PLATE
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.

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Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TOOL BITS
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.
Williams, J. H., & Co., Buffalo, N. Y.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TOOLS—Metal Cutting
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Pratt & Whitney Div. Niles-Bement-Pond Co., Hartford, Conn.

TOOLS—Precision
Starrett, L. S., Co., Athol, Mass.

TOOLS—Safety, Steel Stamp
Cunningham, M. E., Co., Pittsburgh.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.
Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

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TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

TRAMRAILS—Overhead Systems
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

TRAMWAYS—Wire Rope
Leschen, A., & Sons Rope Co., St. Louis, Mo.

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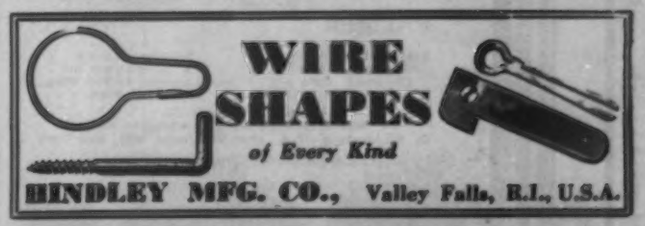

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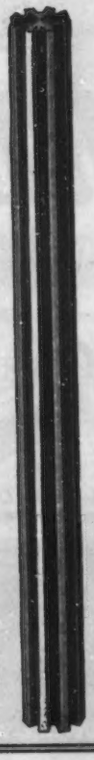

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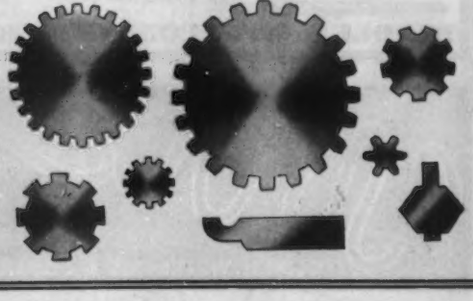

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TRANSCRIBING MACHINES
Dictaphone Sales Corp., 420 Lexington Ave., New York City.

TRANSMISSIONS—Hydraulic
American Engineering Co., Philadelphia.
Oilgear Co., The, 1311 W. Bruce St., Milwaukee.

TRANSMISSIONS—Variable Speed
Link-Belt Co., Chicago.
Reeves Pulley Co., Columbus, Indiana.

TRAPS—Steam
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

TREADS—Safety
American Pressed Steel Co., Phila., Pa.
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.
Hendrick Mfg. Co., Carbondale, Pa.
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TROLLEYS
Curtis Pneumatic Machinery Co., 1948 Kienlen Ave., St. Louis, Mo.
Hanna Engineering Works, 1761 Elston Ave., Chicago.

TRUCKS—Dump (Industrial)
Towmotor, Inc., Cleveland.

TRUCKS—Elevating (Power)
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland.
Barrett-Cravens Co., Chicago.
Elwell-Parker Electric Co., The, Cleveland.
Towmotor, Inc., Cleveland.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Factory, Hand
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.

TRUCKS—Lift (Hand & Foot)
Barrett-Cravens Co., Chicago, Illinois.
Lewis-Shepard Co., 122 Walnut St., Watertown Station, Boston.
Yale & Towne Mfg. Co., The, Phila. Div., Phila., Pa.

TRUCKS—Scoop (Industrial)
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Baker-Raulang Co., The, 2175 W. 25 St., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
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Taylor-Wilson Mfg. Co., McKees Rocks, Pa.
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TUBES—Boiler
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Pittsburgh (Pa.) Steel Co.
Steel & Tubes, Inc., Cleveland.

TUBES—Copper Alloy
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TUBES—High Carbon
Ohio Seamless Tube Co., Shelby, Ohio.
Steel & Tubes, Inc., Cleveland.

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Ohio Seamless Tube Co., Shelby, Ohio.
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Ohio Seamless Tube Co., Shelby, Ohio.
Steel & Tubes, Inc., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

TUBULAR PRODUCTS
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Steel & Tubes, Inc., Cleveland.

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TUNGSTEN—Metals & Alloys
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

TUNGSTEN CARBIDE
Carboloy Co., Inc., 2985 E. Jefferson Ave., Detroit.

TURBINE-GENERATORS—Steam
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TURBO-COMPRESSORS
Spencer Turbine Co., Hartford, Conn.

TURNTABLES
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

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Canton Fdry. & Mch. Co., Cleveland.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co., The.
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Morse Twist Drill & Mch. Co., New Bedford, Mass.

TYPE—Steel
Noble & Westbrook Mfg. Co., The, East Hartford, Ct.

UNIONS
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UNIT HEATERS—Electric
American Foundry Equipment Co., The, 401 Byrkit St., Mishawaka, Ind.

VALVES—Acid Resisting
Dietzel Lead Burning Co., Pittsburgh
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

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Littell, F. J., Mch. Co., Chicago.

VALVES—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia, Pa.
Galland-Henning Mfg. Co., Milwaukee.
Hanna Engineering Works, 1761 Elston Ave., Chicago.
Hannifin Mfg. Co., Chicago.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.
Westinghouse Air Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago.
Jarecki Mfg. Co., Erie, Pa.
North American Mfg. Co., The, Cleveland.
Wood, R. D., & Co., Philadelphia.

VALVES—Hydraulic
Baldwin-Southwark Corp., Southwark Div., Philadelphia.
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Galland-Henning Mfg. Co., Milwaukee.
Wood, R. D., & Co., Philadelphia.

VALVES—(Pressure Seated) Pneumatic
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VALVES—Proportioning
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VANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

VARNISH—Acid Resisting
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.

VISES
Cincinnati (Ohio) Milling Mch. Co., The.
Jarecki Mfg. Co., Erie, Pa.

WASHERS—Iron or Steel
Sessions, J. H., & Son, Bristol, Conn.

WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.

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Washburn Co., The, Worcester, Mass.

WASHING MACHINES—For Metal Parts
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Lillie, Dexter P., Co., New Bedford, Mass.

WATER SOFTENERS AND PURIFIERS
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Bundy Tubing Co., Detroit, Mich.

WELDING—Electric
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Lincoln Electric Co., The, Cleveland.
Una Welding, Inc., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.

WELDING CONTACTORS
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WELDING CONTACTS—Resistance
Electroloy Co., Inc., 50 Church St., New York City.

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Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit.

WELDING FIXTURES
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Una Welding, Inc., Cleveland, Ohio.

WELDING MACHINES—Butt
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Electric Arc
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General Electric Co., Schenectady, N. Y.
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Hobart Bros., Troy, Ohio.
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Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

WELDING MACHINES—Electric Arc, Second-Hand. (See Clearing House Section)

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Thomson-Gibb Elec. Welding Co., Lynn, Mass.

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Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.

WELDING MACHINES—Seam
Federal Machine & Welder Co., Warren, Ohio.

WELDING MACHINES—Spot
Federal Machine & Welder Co., Warren, Ohio.
Swift Electric Welder Co., Detroit.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.

WELDING MACHINES—Universal Spot & Arc
Electric Arc Cutting & Welding Co., The, Newark, N. J.

WHEELS—Rolled Steel
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Standard Steel Wks. Co., Burnham, Pa.

WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.

WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

WIRE—Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Phosphor Bronze Smelting Co., The, Phila.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Seymour (Conn.) Mfg. Co.

WIRE—Electric Heat Resisting
Globar Div., The Carborundum Co., Niagara Falls, N. Y.

WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, O.
Wickwire Bros., Cortland, N. Y.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Insulated
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Mattress
Roebling's, John A., Sons Co., Trenton, N. J.

WIRE—Netting
Ludlow-Saylor Wire Co., St. Louis, Mo.
Roebling's, John A., Sons Co., Trenton, N. J.
Wickwire Brothers, Cortland, N. Y.

WIRE—Piano and Music
Webb Wire Works, New Brunswick, N. J.
Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

WIRE—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.

WIRE—Special Drawn Shapes
Rathbone, A. B. & J., Palmer, Mass.

WIRE—Spring
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Barnes, Wallace Co., The, Div. of Associated Spring Corp., Bristol, Conn.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.

WIRE—Spring (Music)
Webb Wire Works, New Brunswick, N. J.

WIRE—Stainless Steel
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Rustless Iron & Steel Corp., Baltimore, Md.
Webb Wire Works, New Brunswick, N. J.

WIRE—Steel
Bethlehem (Pa.) Steel Co.
Prentiss, Geo. W., & Co., Holyoke, Mass.
Wickwire Brothers, Cortland, N. Y.

WIRE—Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Lincoln Electric Co., The, Cleveland.
Maurath, Inc., 7400 Union Ave., Cleveland.
Page Steel & Wire Div., American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.
Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Una Welding, Inc., Cleveland, Ohio.
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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City.

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Manville, E. J., Mch. Co., Waterbury, Ct.
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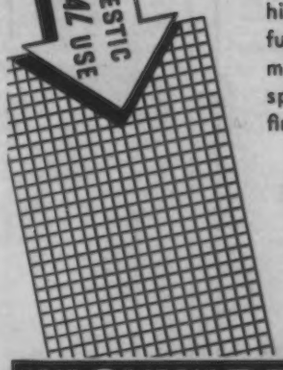

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5 ton Northern,	47'	Span, Motors 220 volt DC
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SYNCH. MOTORS	350 H.P. Ridgway 900 RPM
	175 H.P. G.E. 600 RPM
SLIP RING MOTORS	150 H.P. G.E. 720 RPM
	125 H.P. G.E. 1200 RPM
	100 H.P. G.E. 900 RPM
	100 H.P. G.E. 1200 RPM
	100 H.P. F.M. 600 RPM
	75 H.P. West. 1200 RPM (4)
	60 H.P. G.E. 900 RPM
	50 H.P. G.E. 900 RPM
	50 H.P. West. 1200 RPM
SQUIR. CAGE MOTORS	220 H.P. Cr. Wh. 720 RPM
	150 H.P. G.E. 600 RPM
	125 H.P. Al. Ch. 1750 RPM
	100 H.P. G.E. 900 RPM
	100 H.P. West. 720 RPM
	75 H.P. G.E. 900 RPM
	75 H.P. G.E. 720 RPM
	75 H.P. Al. Ch. 600 RPM
	75 H P. G.E. 450 RPM
	60 H.P. G.E. 1200 RPM
	50 H.P. G.E. 1200 RPM
	50 H.P. Ridgway 3600 RPM
A.C. GEN.	200 K.W. G.E. 720 RPM
	150 K.W. Al. Ch. 900 RPM
	150 K.W. G.E. 900 RPM
	90 K.W. G.E. 900 RPM
	75 K.W. G.E. 1200 RPM
	45 K.W. G.E. 1200 RPM
	30 K.W. West. 1200 RPM
MOTOR GEN. SETS	100 K.W. G.E. 230 V.
	100 K.W. G.E. 115 V.
	50 K.W. G.E. 230 V.
	30 K.W. West. 230 V.
115 V. D.C. MOTORS	90 H.P. G.E. 900 RPM
	50 H.P. G.E. 1750 RPM
	40 H.P. G.E. 400/600 RPM
230 V. D.C. MOTORS	150 H.P. G.E. 1750 RPM
	100 H.P. West. 625 RPM
	75 H.P. Burke 1140 RPM
	75 H.P. West. 850 RPM
	75 H.P. E.D. 400 RPM
	60 H.P. West. 1200 RPM
	60 H P. E. D. 500/1200 RPM
	50 H.P. G.E. C0181-82, 720/1800 RPM
	30 H.P. G.E. 825/2000 RPM
	15 H.P. G.E. 600/1800 RPM
	15 H P. G.E. 500/2000 RPM
	10 H.P. G.E. 400/1600 RPM
	10 H.P. G.E. 575/1725 RPM
550 V. D.C. MOTORS	66 H.P. G.E. 1700 RPM
	50 H.P. G.E. 1200 RPM
	10 H.P. G.E. 1075 RPM
ELEC. WELDERS	500 amp. West. Multiple Operator
	100 amp. Hobart Portable
ELEC. HOISTS	5 Ton G.E. 230 V.
	3 Ton Shepard 230 V.
	2 Ton G.E. A.C.
	1 Ton Euclid A.C.
PLATERS	5000 amp. Boissier Mtr. Driven

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Many others—all capacity.

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1—1000 hp. Cr. Wheel, Syn. 600 rpm.
1— 750 hp. El. Machy. Syn. 514 rpm.
1— 500 hp. Al. Chal. Slipr'g 450 rpm.
1— 150 hp. Al. chal. squir. cge. 720 rpm.
2— 200 hp. Westghse. squir. cge. 1200 rpm.
1— 100 hp. G. E. vert. splir'g 900 rpm.

PLATERS
1—4000 amp. Hanson Van Winkle, 6/12 V.
1—3500 amp. Bogue, 6/12 V.

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1—1250 KVA. 2300-3-60 3600 rpm. Syn.

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3—100 KVA. Maloney—12000 460 V.

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1— 500 KVA. El. Machy. 514 rpm.
1— 720 KVA. G. E. 200 rpm.
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1— 300 & 1—240 KVA. G. E. 720 rpm.

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8—120	General Electric		300/900
1—100	Westinghouse	SK	475/1000
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2	12x12	Gardner		350
1	13x10	Worthington		435
1	12x12x10	Ingersoll-Rand	FR-I	368
3	12x10	Ingersoll-Rand	ER-I	"
4	12x10	Chicago Pneumatic	NSB	"
2	10x10	Ingersoll-Rand	ER-I	254
2	10x10	Chicago Pneumatic	NSB	"
1	9½x10	Worthington	L	236
2	12x 9	Worthington	L	354
1	10x 9	Pennsylvania	3A	240
2	8½x 9	Worthington	L	160
4	12x 8	Ingersoll-Rand	ER-I	311
2	12x 8	Pennsylvania	3A	311
1	10x 8	Ingersoll-Rand	ER-I	215
1	10x 8	American	WP	215
1	9x9x8	Ingersoll-Rand	FR-I	173
3	9x8	Ingersoll-Rand	ER-I	"
1	9x8	Chicago Pneumatic	NSB	"
1	8x8	Chicago Pneumatic	NSB	136
1	9x6	Pennsylvania	3A	153
2	8x6	American	WP	120
3	7x6	Ingersoll-Rand	ER-I	92
4	7x6	Chicago Pneumatic	NSB	"
2	7x6	American	WP	"
2	7x6	Gardner		"
1	6x3¼x6	Ingersoll-Rand 350	ER-2	67
1	6x6	Ingersoll-Rand	ER-I	"
1	6x6	Chicago Pneumatic	NSB	"
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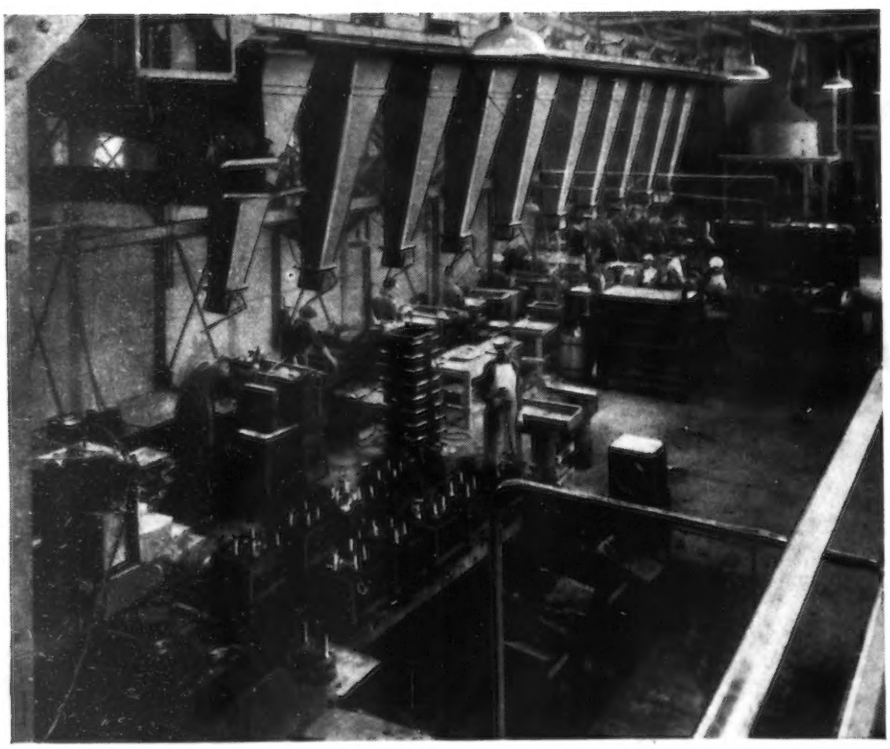

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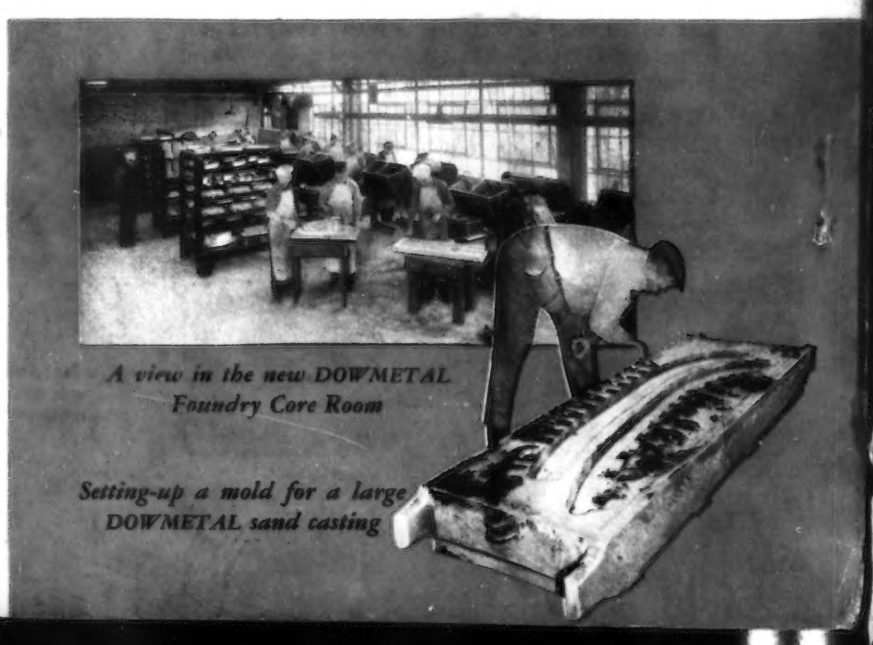

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